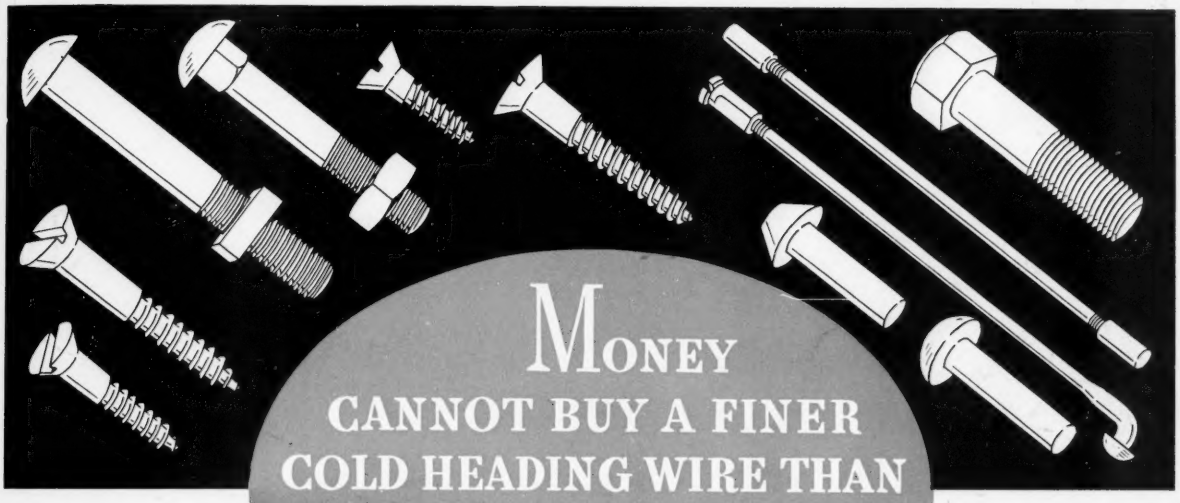
WIRE

APRIL 1936

AND WIRE PRODUCTS



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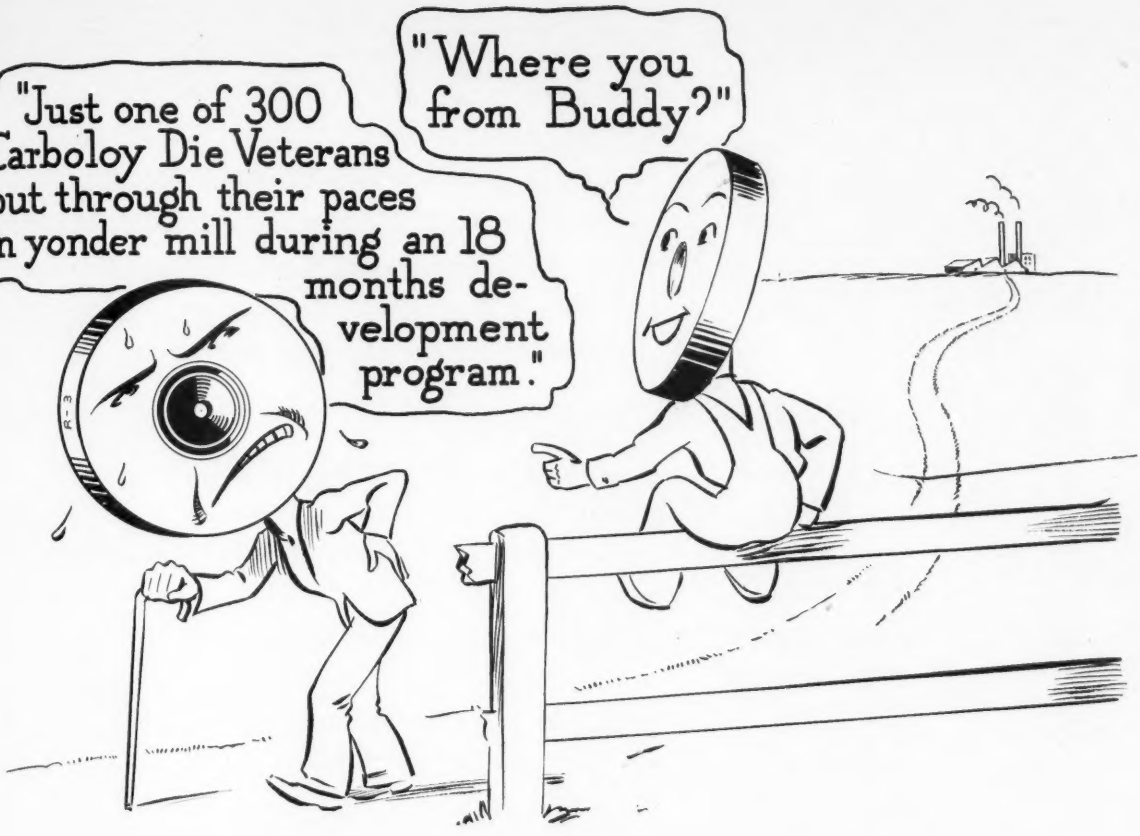
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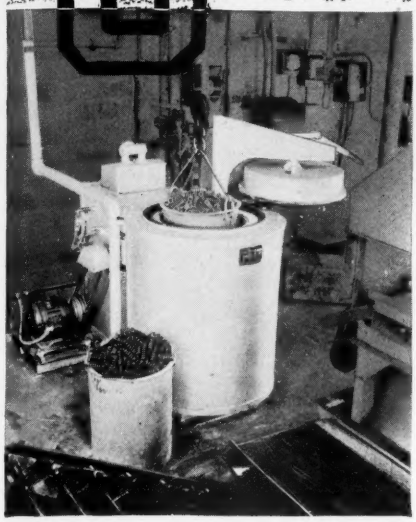

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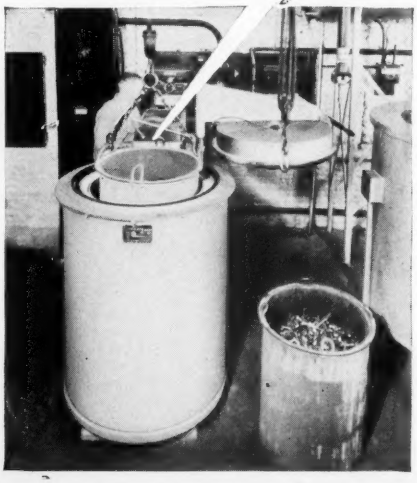

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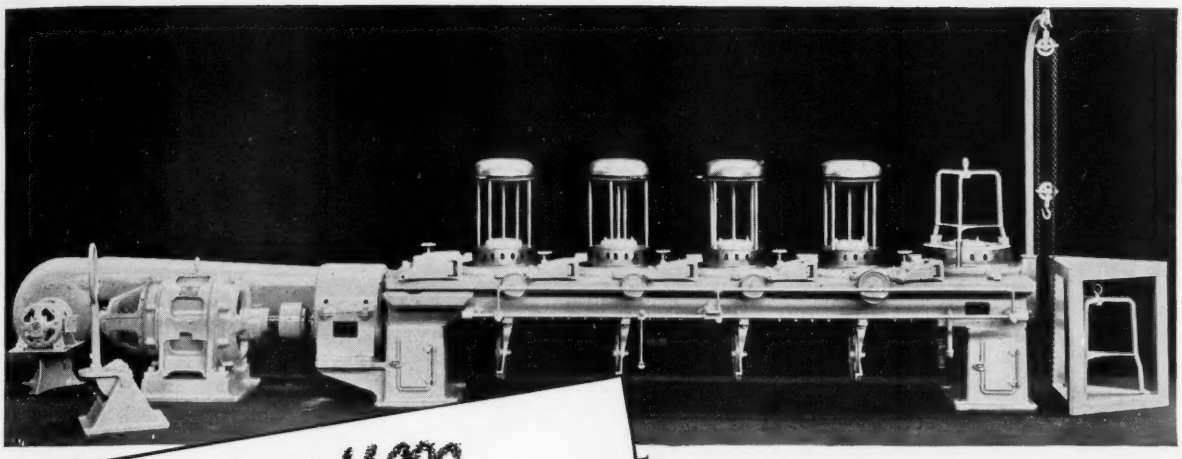

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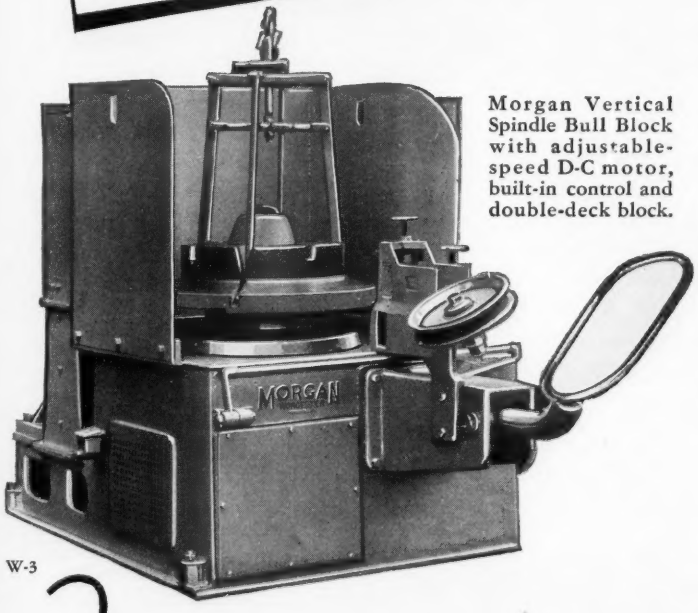

Morgan Vertical Spindle Bull Block with adjustable-speed D-C motor, built-in control and double-deck block.

W-3

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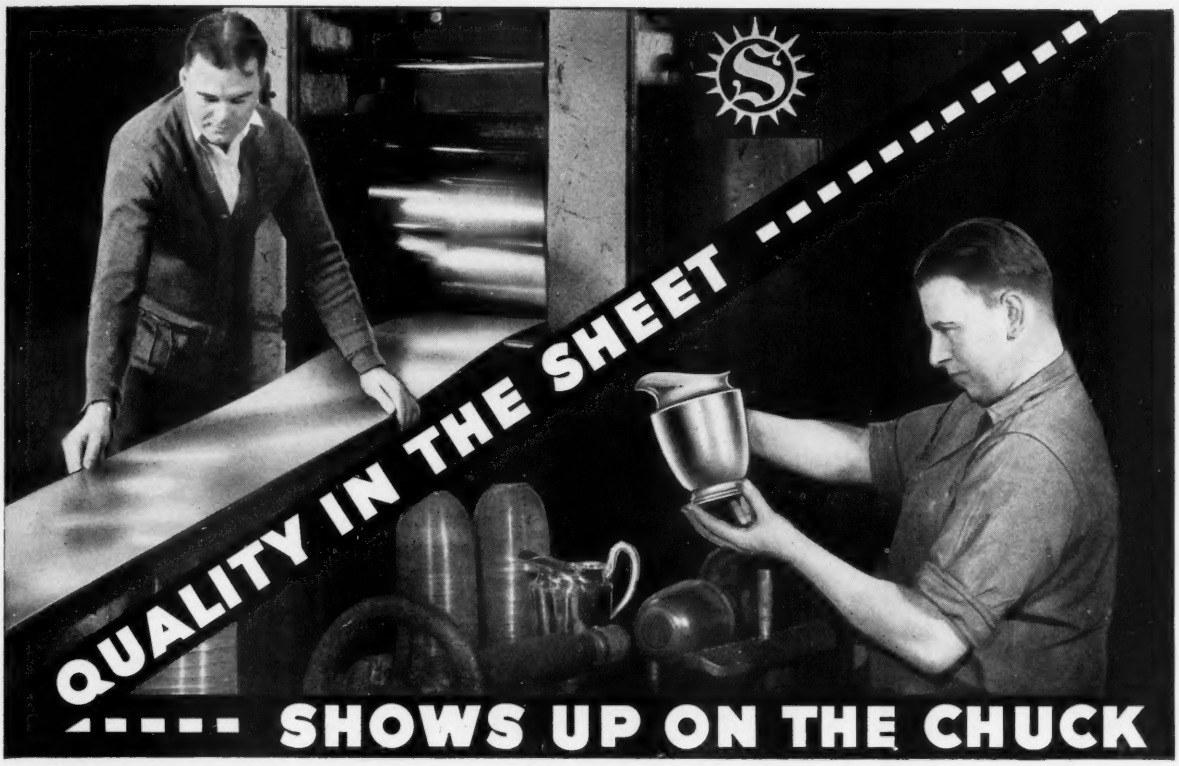

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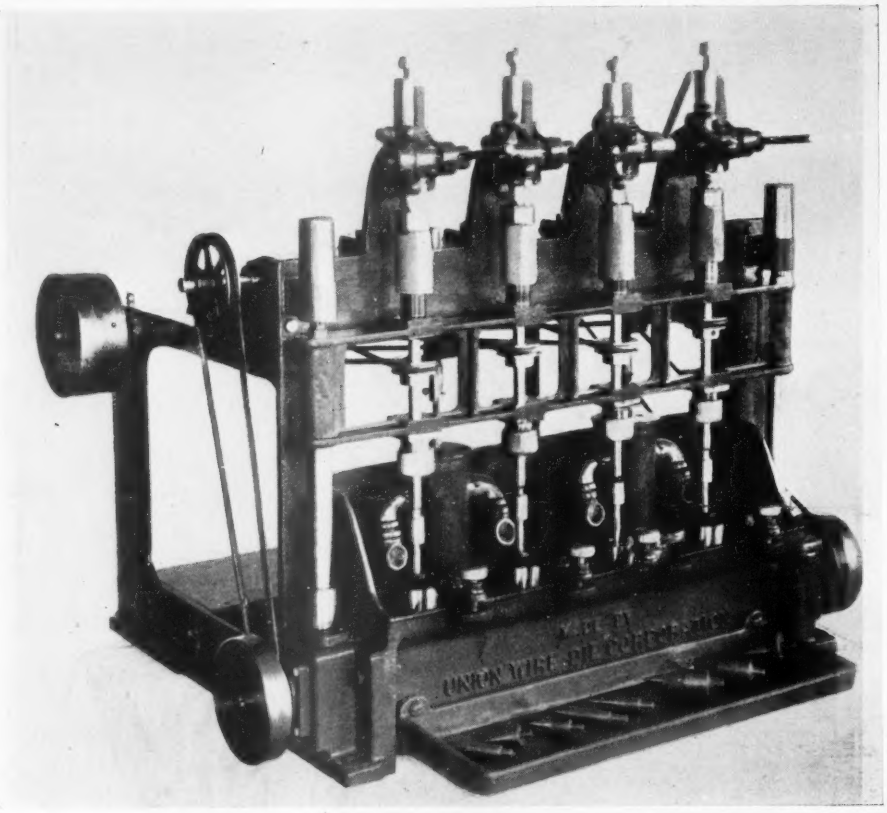

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 11 April 1936 No. 4

Designated as

Official Publication By The Wire Association

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17 E. 42nd St., New York City. Telephone: Murray Hill 2-4188

Publication Office: Washington, N. J.

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✦ ✦ ✦

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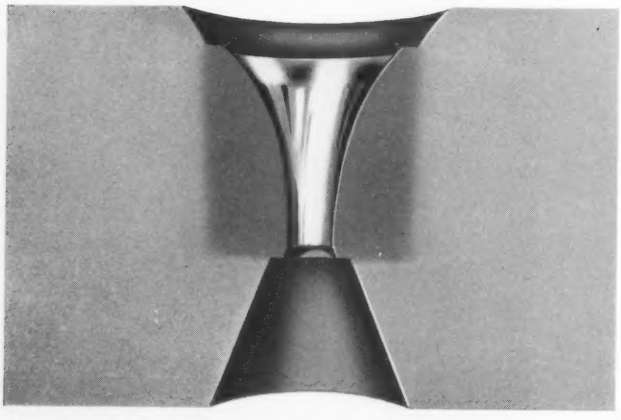

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 11 APRIL 1936 No. 4

The Calculations of Wire Drafts and the Use of the Slide Rule in the Wire Mill

By Tom Gore, Jr.
Representative Hazard Wire Rope Co.,
New York, N. Y.

A method of analysing and solving various mathematical problems encountered in the wire mill is offered with the object of indicating one method for handling such problems. ✦ ✦

THE Wire Mill superintendent in the days of the simpler metals, such as, Iron, Steel and Copper, had little need to deviate from the Standard Wire Gauges which were so made that he could govern his wire drawing procedure by the Gauge Numbers. He had no problems involving the Reduction By Sectional Areas.

✦ ✦ ✦

WITH the ever increasing number of Alloys processed in the wire mill and the more accurate handling of the simpler metals the old Gauge Numbers are no longer sufficient.

✦ ✦ ✦

THE characteristics of wire vary with their 'cold drawn' change in sectional area. As all wire mill procedure is arranged to alter these characteristics the Basic Principle of sectional areas must be thoroughly understood. Perhaps in the future a Universal Wire Gauge based on Areas, or a Micrometer which is calibrated in Areas, will be developed which will result in a system of notation based on Areas instead of the present system of Diameters. At the present however we must Measure in diameters and Think and Calculate in terms of sectional areas.

ALTHOUGH everyone is more or less familiar with the calculation of sectional areas the following analysis and solutions of the various problems encountered in the wire mill is offered with the object of indicating one method of handling these problems.

✦ ✦ ✦

The Formula Used for Solving the Various Problems

THE area of any circular cross-section is Pi times the Radius Squared, or as it is also written, .7854 times the Diameter Squared. In all sectional area problems encountered in the wire mill we are not concerned with the NUMERICAL sectional area but with the RELATION of one sectional area to another. Therefore in all wire mill sectional area calculations we may omit entirely all use of Pi and .7854, and deal only with the Diameter Squared. This greatly simplifies all calculations and unless there is a special need for the Numerical sectional area we may neglect Pi and .7854.

Sectional areas are proportional to the squares of their diameters.

This fact is the BED-ROCK of all our dealings with DRAFTS and should be kept constantly in mind.

TOM GORE, JR.
Graduated from Annapolis 1924, transferred to Naval Reserve 1927. From then until 1931 employed by the Hazard Wire Rope Company in various capacities in the manufacturing department and for three years as sales engineer and representative. Now eastern sales representative.

✦ ✦ ✦

Typical Applications of the Formula

(1) To Find: The Second Diameter. (After reduction).

Given: Initial Diameter and Percentage of Reduction.

D_1 is the Initial Diameter

D_2 is the Second Diameter

D^2_1 x % Reduction equals Relative Amount Reduced

D^2_2 equals D^2_1 minus the Amount Reduced

or

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D^2_2 equals (100 minus % Reduction) x D^2_1 # #

Example:—

.120 Dia. to be reduced 30%. Required Second Dia.

$(.120)^2=.0144$ $\quad .0144 \times .70=.01008$

$\sqrt{.01008}=.1004=D_2$ ##

✦ ✦ ✦

(2) To Find: Initial Diameter.

Given: Second Diameter and Percentage of Reduction.

$$D^2_1=\frac{D^2_2}{(100 \text{ minus } \% \text{ Reduction})}$$

Example:—

.050 Dia. which WAS reduced 25%.

Required Initial Diameter.

$$D^2_1=\frac{D^2_2}{(100 \text{ minus } \% \text{ Reduction})}$$

$$D^2_1=\frac{.0025}{.75}=.003333$$

$D_1=.0576$ ##

✦ ✦ ✦

(3) To Find: % of reduction between them.

Given: Two wire diameters.

$$\frac{D^2_1-D^2_2}{D^2_1}=\% \text{ Reduction}$$

Example:—

.120 to .050.

Find % of reduction between them.

$$\frac{(.120)^2-(.050)^2}{(.120)^2}=\frac{.0144-.0025}{.0144}$$

$$=\frac{.0119}{.0144}=82.6\% \text{ ##}$$

✦ ✦ ✦

Uniform Drafting

THE term 'UNIFORM DRAFTING', means that at each pass or hole the wire is reduced the same RELATIVE amount.

THE problem of Uniform Drafting may be shown:

Let D_S=Starting Diameter
D_1=Diameter at first Hole
D_2=Diameter at Second Hole
etc.
D_N=Finishing Diameter
N=Number of Holes.

(See Problem 4)

$$D_3=\frac{.0847}{.119}=.0712 \text{ \# 3}$$

$$D_4=\frac{.0712}{.119}=.0598 \text{ \# 4}$$

$D_5=.050$

Uniform Drafting—Problem 4

$D^2_1=D^2_S$ x (100—% Reduction)

$D^2_2=D^2_1 \times$ (100—% Reduction)

$D^2_3=D^2_2 \times$ (100—% Reduction)
etc.

$D^2_1=D^2_S \sqrt[N]{\frac{D^2_N}{D^2_S}}$ $\quad D_2=D_1 \sqrt[N]{\frac{D_N}{D_S}}$

$D_1=D_S \sqrt[N]{\frac{D_N}{D_S}}$

Let R=(100—% Reduction)

$$R=\frac{D^2_1}{D^2_S} \quad R^N=\frac{D^2_1}{D^2_S} \times \frac{D^2_2}{D^2_1} \cdots \frac{D_N}{D^2_{N-1}}$$

$$R=\frac{D^2_2}{D^2_1} \quad R^N=\frac{D^2_N}{D^2_S}$$

$$R=\frac{D^2_3}{D^2_2} \quad R=\sqrt[N]{\frac{D^2_N}{D^2_S}}$$

etc.

The solution of $\sqrt[N]{\frac{D_N}{D_S}}$ requires the use of the logarithm tables.

✦ ✦ ✦

TO simplify the calculations it is convenient to change $\sqrt[N]{\frac{D_N}{D_S}}$ to $\sqrt[N]{\frac{D_S}{D_N}}$ (This is done merely to shorten the steps when solving the complete problem by logarithms (See Example Following).

✦ ✦ ✦

Example:—Problem 4.

.120 to .050 5 holes equal drafting.

$\sqrt[N]{\frac{D_S}{D_N}}$

.120 log 9.0792
.050 log 8.6990
5 | 0.3802
.119 log .07604

✦ ✦ ✦

By Arithmetic:—

$$D_1=\frac{.120}{.119}=.1008 \text{ \# 1}$$

$$D_2=\frac{.1008}{.119}=.0847 \text{ \# 2}$$

By Logarithms:—

.120 log 9.0792
.119 log .0760
9.0032=.1007 # 1
.0760
8.9272=.0846 # 2
.0760
8.8512=.071 # 3
.0760
8.7752=.0596 # 4
.0760
8.6992=.050 # 5

Therefore:—Drafts are,
.120 - .101 - .085 - .071 - .060 - .050.

✦ ✦ ✦

The Slide Rule

MOST wire mill men are familiar with the use of the Slide Rule. The following methods of using the Rule for Drafting Problems will be of interest. The basis:

Sectional areas are proportional to the squares of their diameters.

✦ ✦ ✦

(1) To Find: Second Diameter.

Given: Initial Diameter and % Reduction.

Set Index of Slide at Initial Wire Diameter on 'D' Scale.

Move Hair-Line to (100-% Reduction) on 'B' Scale.

Under Hair-Line on 'D' Scale find Second Diameter.

✦ ✦ ✦

Example:—

.095 Initial Dia. 33% Reduction. Find Second Dia.

Set right Index of Slide at 95.

Move Hair-Line to 67 on 'B' Scale.

Under Hair-Line on 'D' Scale read 778. 2nd Dia.=.078.

✦ ✦ ✦

(2) To Find: Initial Diameter.

Given Second Diameter and % Reduction.

Reverse procedure of (1)—above.

✦ ✦ ✦

(3) To Find: % Reduction between two wire diameters.

Given: Two wire diameters.

Set Hair-Line at Second Diameter on 'D' Scale.

Move Slide so that Initial Diameter on 'C' Scale is under Hair-Line.

Read 100-% Reduction on 'A' Scale at Index of Slide.

✦ ✦ ✦

Example:—

.120 and .050 Required % Reduction Between them.

Set Hair-Line at 5 on 'D' Scale.

Move Slide so that 12 on 'C' Scale is under Hair-Line.

Read 17.3 on 'A' Scale at Index of Slide.

100—17.3=82.7% Reduction.

✦ ✦ ✦

A Simple Solution of Wire-Strength and Pounds Per Square Inch Problems by Slide Rule

THE three elements involved in these problems are: (1) Wire Diameter, (2) Wire Strength and, (3) Strength Per Square Inch. When any two of these elements are known the third may be read directly from the Slide Rule.

Derivation of Method:—

$$\frac{\text{Sectional Area of Wire}}{\text{One Square Inch}} = \frac{\text{Strength of Wire}}{\text{Strength Per Square Inch}}$$

$$\frac{.7854\ D^2}{1} = \frac{D^2}{\frac{1}{.7854}} = \frac{D^2}{1.273}$$

$$\frac{\text{Strength of Wire}}{\text{Strength Per Square Inch}} = \frac{D^2}{1.273}$$

✦ ✦ ✦

METHOD:—

Set Hair-Line on Wire Dia. on 'D' Scale.

Move Slide so that 1.273 is under Hair-Line.

For any Strength of Wire on 'A' Scale, the coincident.

Point on 'B' Scale is the Per Square Inch Strength for that Wire Strength.

Example:—

(6) To Find: Pounds per Square Inch.

Given: .055 Dia. Wire Strength 650 lbs.

Set Hair-Line at 55 on 'D' Scale.

Move Slide so that 1.273 on 'B' Scale is under Hair-Line.

Coincident with 65 on 'A' Scale.

Read 274 on 'B' Scale.

.055 Dia. Wire Strength 650 lbs. equals 274,000 lbs./in.^{2}

✦ ✦ ✦

(7) What Wire Strength must it have for 220,000 lbs./in^2.

Given. .607 Dia. Wire.

Set Hair-Line at 67 on 'D' Scale.

Move Slide so that 1.273 on 'B' Scale is under Hair-Line.

Coincident with 22 on 'B' Scale.

Read required wire strength 774 lbs. on 'A' Scale.

At a later date we will publish Wire Drafting Tables, etc., by the same author.

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On the Modulus of Elasticity of Wire Ropes

By B. M. Suslov,

Metallurgical Engineer, Research Institute of Grosneft Trust,
Grosny, U. S. S. R.

An investigation of present practice in Russia of the manufacture of wire rope and cable together with tables showing the basis of research and the conclusions reached. ✦ ✦ ✦

THE increasingly wide use of wire ropes for technical purposes, such as elevators, cranes, wire rope ways, bridges, etc., creates a real necessity for examining their various properties and peculiarities. In fact, this necessity was pointed out recently by research work in some leading industrial countries; the United States, England, Japan and especially in Germany. ✦ ✦ ✦

THE investigation of wire ropes, by a method of mathematical calculation based on the elasticity theory, is considered at present an insolvable problem, owing to a great number of unknown changeable units, which enter as a part in the solution of such a problem. To simplify this, it is necessary, when calculating, to make some allowances, which often do not closely agree in reality, and require an experimental investigation.

✦ ✦ ✦

IN calculating the strength of the constructions and machine parts the knowledge of the Elasticity Modulus value is absolutely necessary as the latter states the relation between the deformations of the material and stresses inducing them.

AS related to the wire ropes this Modulus of Elasticity has a special significance in tension, as this value is included in the formulas serving for the mathematical calculating of the dynamical stresses in wire ropes when handling loads on account of the mass inertia, longitudinal vibrations, the phenomenon of resonance in lines (ropes) etc.

✦ ✦ ✦

IN the oil-field industry the knowledge of Modulus of Elasticity is necessary for determining the elongation of wire rope in the case of using it for running deep oil pumps instead of sucker rods and also in investigating the phenomenon of resonance encountered in the dead end of the rotary drilling line.

✦ ✦ ✦

AT the same time the value of Modulus of Elasticity for wire ropes is not so definite as it is for steel. If, for instance the Modulus of Elasticity for steel ranges in the limits 20,000 — 22,000 kg/mm² and is considered as a constant value in calculating, for wire ropes this Modulus ranges in larger limits depending on the construction and physical state of the rope.

✦ ✦ ✦

THIS question is not clearly explained in technical literature (press) and different authors bring forth different data for elasticity modulus for individual ropes without fixing the relationship of such elasticity modulus by the constrction, wire quality, kind of rope lay, etc.

✦ ✦ ✦

FOR example the following data is given in German handbook "Hütte" vol. 1:

For single lay rope:

$E_r = 0.6 \times E_w$

For double lay rope:

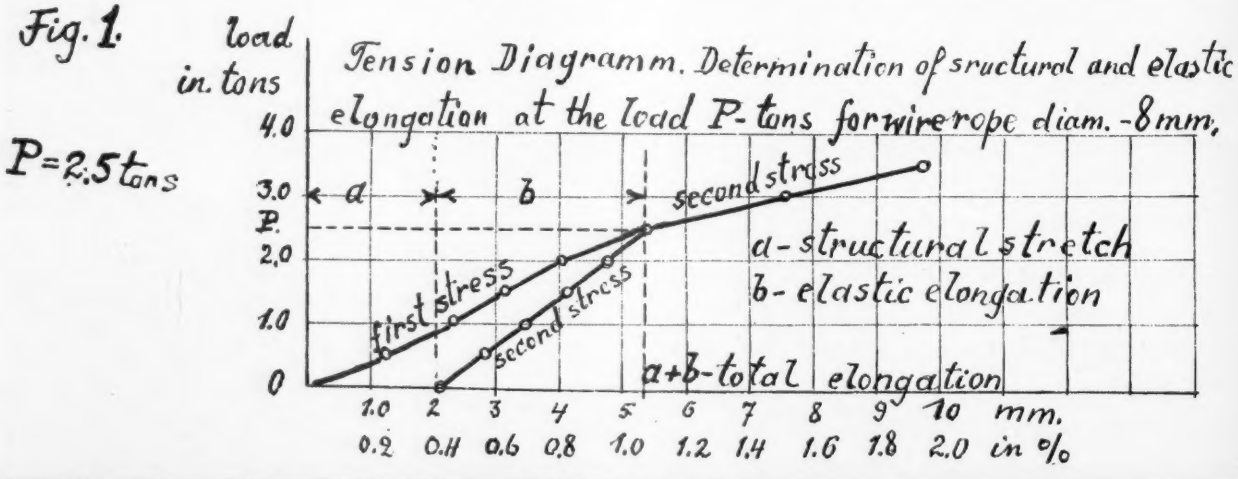
$E_r = (0.6)^2 \times E_w$

For triple lay rope:

$E_r = (0.6)^3 \times E_w$

where, E_r—is the elasticity modulus of a wire rope and E_w—is the elasticity modulus of a steel wire.

Fig. 1.



TAKING it to be equal to 20,000 klr/mm² (28,450,000 lbs. sq. in.), we will get accordingly:

E_1—12,000 klr/mm² (17,080,000 lbs. per sq. in.)

E_2—7,200 klr/mm² (10,250,000 lbs. p. sq. in.)

E_3—4,320 klr/mm² (6,150,000 lbs. p. sq. in.)

✦ ✦ ✦

SOME authors bring forth other figures: The German Prof. Bach shows $E_r=\frac{3}{8}$ E_w=7,600 klg/mm². The German Prof. Wawrziniok shows for patented ropes of an "entire cross section" or closed construction, the following elasticity modulus values (for individual ropes):

E_r=12,200 klr/mm² (17,360,000 lbs. p. sq. in.)

E_r=14,000 klr/mm² (19,920,000 lbs. p. sq. in.)

E_r=14,600 klr/mm² (20,750,000 lbs. p. sq. in.)

✦ ✦ ✦

ACCORDING to information received by the author from the American firm of John A. Roebling's Sons Co. the latter accepts: "in general, for 6-strand ropes having steel wires in the outside strands and hemp in the core, the modulus of elasticity of approximately—12,000,000 pounds p. sq. in. (8,450 klg/mm².). The corresponding value for 6-strand steel wire ropes with a metallic core is —17,000,000 pounds p. sq. in. (11,-950 klg/mm²). In the case of steel strands, all metallic, the modulus will be in the neighborhood of 21,-000,000 pounds p. sq. in. (14,800 klg/mm²)".

✦ ✦ ✦

THIS manufacturer of wire rope shows that the above modulus values must be considered approximate because they will depend somewhat on the fabrication of the rope and will vary to a considerable degree with length of time the rope is kept under the stress.

✦ ✦ ✦

ACCORDING to information received by the author from the German firm of Felton & Guilleaume A.G., the latter accepts in general, for new wire ropes with hemp in the core, independently of their construction, a modulus of elasticity value from 6,000 to 7,000 klg/sq. mm (8,530,000-9,950,000 lbs./sq. in.) approximately. This manufacturer points out, however, that these values could be altered after the first stressings and that according to their time of operation they can be doubled.

✦ ✦ ✦

IN view of such uncertainty in the elasticity modulus values of wire ropes and in order to have detailed data the author has put the problem before himself of determining the elastic properties of wire ropes. For research work the wire ropes made in U. S. S. R. have been taken. All the units, which characterize the construction of ropes investigated by author, are given in table No. 1. For a more complete understanding of this problem some samples of wire ropes of small diameter, have been investigated. For example: the German old rope diam.—9.7 mm. from an auto lifting crane "Büssing" and a new three strand wire rope of an unknown make.

✦ ✦ ✦

IT is known, that not only ropes, but also the most important construction materials, like steel, cast iron, natural stones, concrete, wood, etc., possess elastic properties; that is, that by applying certain pressures or pulls to them, they receive a certain elastic deformation. The relative size of the latter for a given material depends on the stress of material "S", usually expressed in klg/sq. mm (lbs./sq. in.) and reversely each "S" corresponds to a certain deformation.

✦ ✦ ✦

CONCERNING ropes, the most interesting point is elongation. The latter is usually referred to length unit, and a "relative elongation" is received then, which will be called by Greek letter δ (delta). There are certain equations for each kind of material, combining the stresses and deformations.

$S=\int(\delta)$ and reversely $\delta=\psi(S)$ where S is the unit stress, δ is the unit deformation.

✦ ✦ ✦

SUCH a relationship, speaking generally, which is different for different grades of materials, is, by proposal of Mr. Biffinger, research worker, expressed by a general formula

$$S=\left(\frac{\delta}{n}\right)^{\frac{1}{m}}$$ and reversely $\delta=n \times \sigma^m$

In practice m=1 is taken for iron and steel, and the formulas are simplified: $S=\frac{1}{n} \times \delta$ and $\delta=n \times S$ when n is called the "elongation coefficient" for a given material.

✦ ✦ ✦

IN literature, to characterize elastic properties of a material, the value — E is more in use, which can be expressed in a general differential form of:

$$E=\frac{dS}{d\delta}$$

✦ ✦ ✦

AN "average elasticity modulus" is also being used as a value, in the variations: from S=0 to $S=S_1$ or from $S=S_1$ to $S=S_2$ whereby $E^1=\frac{S}{\delta}$ or $E^1=\frac{\Delta S}{\Delta\delta}$

Generally speaking, E is a changeable value, equivalent to an angles tangent, which is composed of a tangent of an elastic deformation curve $S=\int(\delta)$ with the axis abscissa. In practice, the value E, for iron and steel becomes constant to a certain degree i. e. $E=E^1=$ Const.

✦ ✦ ✦

THIS relation, was fixed to a certain degree of precision by Mr. Hooke, the British research worker, in the beginning of the XVIII century, and from that time on, it is known, under the name "Hooke's law." Despite the fact that the latter has found a general use for the elasticity and strength of materials theory, he can be reckoned as sufficiently accurate only for these materials, and for such inside limits of stresses, for which it has been tested. This fact refers, certainly to iron and steel, for which an existing rectilinear relation has been found between S and δ and up to certain limit, called "proportionality limit", which comes near to the "elastic limit".

SUCH materials as cast iron, natural stones, concrete, wood, etc., are not subjected to "Hooke's law", that is, no proportional relation between stress S and deformation δ, has been fixed for them, and beside that the elasticity modulus in tension will not be equal to the elasticity modulus in compression.

✦ ✦ ✦

BY studying the elastic properties of ropes, it was necessary and interesting to find out the following:

(1) The character of relation between S=∫ (δ).

(2) Whether "Hooke's law" takes place here and if the latter takes place up to what degree does it?

(3) The effect of rope construction on its modulus of elasticity value.

(4) Which wire ropes are the most suitable for deep well pumping.

✦ ✦ ✦

FOR this purpose, we have been making use of a more simple "graphic method" by means of plotting down on the tension (stress) diagram, the loads (stress) in tons, from the axle ordinate, and the elongation in mm. from the axle abscissa, receiving thus the tension rope diagram (curve), up to its rupture.

✦ ✦ ✦

THE diagram (curve) received shows summary elongations in function from the load (stress), which, however, for the determination of the ropes elastic elongation, is not sufficient. When a rope is first subjected to working tension its elongation consists of both an elastic and structural stretch. The structural (constructional) stretch is not a definite quantity, but is variable, depending on the size and power of the machine used to fabricate the rope, together with knowledge and skill of fabrication.

✦ ✦ ✦

IT was found, that when any applied tension, between the manufactured tension and the elastic limit of rope, was held a period of time, a continued elongation of the specimen occurred. This additional elongation without increase of load, was the structural stretch.

REMOVAL of this structural stretch was possible by multiple stressing. For determination of the elastic elongation from the total one, the following method of loading and unloading, has been applied, that is: the rope was loaded, to a certain degree of P klg and the total elongation received was measured by an extensometer, with the accuracy to 0.05 mm. The gauge length of rope specimens was 500 mm. Then the load was taken off to P=O and the permanent (structural) elongation of the rope specimen measured, as resulted from the load P klg. The differences of these two elongations, have produced an elastic one, corresponding to the load P klg (see Fig. 1).

✦ ✦ ✦

BY a repeated load, from O to P klg, the rope usually kept its permanent (structural) elongation, which it received from the first load (stress) constantly till the load P. Therefore the elongations which have been observed during repeated loads (multiple stressing) up to P klg, have been already elastic ones.

✦ ✦ ✦

ON the tension diagram (or stress-strain diagram), this is explained by the fact, that the curve elongation point P, which corresponds to the first load (stress) — P klg, usually coincides, or is near to the curve elongation point P, at repeated loads. If such a coincidence had not occurred at repeated loads (stress), it meant, that the ropes permanent (structural) elongation have not disappeared yet, and the rope unloading and loading to P klg has been repeated up to the entire elimination of the permanent (structural) elongation. We consider the structural stretch removed when the rope shows well defined and uniform elastic stretch and recovery.

✦ ✦ ✦

BY plotting consequently a series of points for all intermediate loads from O to P klg., at first stress, the rope summary elongation curve has been obtained.

✦ ✦ ✦

BY plotting points for intermediate loads from O to P klg at a repeated load up to P klg the ropes elastic elongation curve has been obtained **(see Fig. 1).**

✦ ✦ ✦

BY transition over a first load (stress) of P klg permanent (structural) elongation of the rope has again been observed and this has been summed up from elastic elongation into a total one, and by a further increase of the load the elongations curve took a direction, which has been a smooth continuation of the elongation curve at a first P klg load **(see Fig. 1).**

✦ ✦ ✦

THE test of the rope and the determination of its elastic elongation took place from the first stress (load) P equal to 1 ton and then consequently, the load P has been increased through intervals of: 0.5; 1.0; 3.0; 5.0 tons according to breaking strength value of a rope, choosing a bigger interval for stronger rope. The elastic elongations of a rope were examined up to their rupture.

✦ ✦ ✦

BY such a method, tension (stress) diagrams for each investigated rope sample, have been received, whereby, for greater safety and precision of determinations of elasticity modulus values of each rope, two samples of same have been taken. The tension (stress) diagrams allowed us to investigate the elasticity properties of ropes, up to the rupture of the last ones, whereby, for each rope load (stress), average elasticity modulus in the variations from O to P tons has been calculated.

✦ ✦ ✦

FOR convenient comparison a general elasticity moduluses (table 2) for all investigated ropes has been compiled.

✦ ✦ ✦

BY calculating modulus of elasticity values, in view that the function of elastic elongation S=∫ (δ) has shown to be variable, and, generally speaking, different for different ropes and loads, and that elasticity modulus—E—was a changeable unit (value), it was necessary to determine a certain average modulus E^1 for a known part of a curve S=∫ (δ) by means of straightening a curve between two points. For example to calcu-

late a modulus E—for a working load of a rope of P—tons, the average modulus—E^1 has been calculated in the variations of loads from O to P tons by the following formula:

$$E^1 = \frac{\Delta S}{\Delta \delta} = \frac{\Delta P \times L}{F \times \Delta L}$$

where: ΔS and $\Delta \delta$ are meaning the increase of values S and δ in accordance with the load increase from O to P tons per value—ΔP tons.

L—is the gage length of a sample rope—500 mm.

ΔL—is the elastic elongation of a sample rope in mm.

F—is the cross section of all wires in a rope in sq. mm.

✦ ✦ ✦

THE analysis of tension diagrams, which have been received by testing of ropes gives a base for the following conclusions:

✦ ✦ ✦

1. THE function of elastic elongations $S=\int(\delta)$ is, generally speaking, curvilinear, and their aspect is different to different ropes construction. For one kind of rope it is convex to the axis abscissa, and to the others the reverse. In some cases it approaches a straight line, and for old ropes it is nearly straightlined.

✦ ✦ ✦

2. THERE are no special characteristical points on the ropes tension curves, when a new rope is first stressed up to its rupture, which are analogues to the "proportionality limit" "yield point" and "elastic limit" ones for a tension curve, in which permanent (structural) elongation of the prestressed rope appear, which is analogical to the "elastic limit" for steel, has not a definite place on the curve for the same rope, and its place changes in relation to value of prestressing tension P, whereby this point comes up, for all ropes by the increase of prestressing tension value. In some cases such as for multiple stressed ropes and for old ropes, for which the function $S=\int(\delta)$ is straightlined, the Hooke's law can take place up to some degree.

THE loading and discharge of ropes in test has been made slowly by hand by the universal testing machine with a capacity of 75 tons, and a general phenomenon has been observed for all the ropes on the ropes tension diagrams, i.e. by unloading the shortening of the ropes length goes on slower, than the ropes load decreasing. Therefore it is observed, that for the same load of a rope the elastic elongation of a rope is lesser when loading than when unloading. On the rope tension diagram this is expressed by a decline of the unloading curve to the right from the loading one, and by the formation of an "elasticity hysteresis loop".

✦ ✦ ✦

3. **IN general Modulus of elasticity value depends on:**

(a) the rope's construction i.e. number of strands, number and diameter of wires in a strand, number and material of center (hemp or metallic one),

(b) kind of rope lay (single, double, triple, regular or Lang lay),

(c) the angles strands and wires lay,

(d) the physical nature of a rope (i.e. whether it is a new or old one, whether the rope was stretched, or not),

(e) the wire material,

(f) the degree of the rope's wear,

g) the degree of the rope's prestressing during the time when it was made in the factory or in the service.

✦ ✦ ✦

THE construction effect on the rope's modulus of elasticity value — E_r:

It is explained from the analysis data of Moduluses in table 2 such as:

New ropes of our Odessa factory from imported wire of construction 6x19 of —114 wires with diameter 1¼" and 1⅛" have shown the average elasticity modulus E in the limit working load for the first stress—5,950 klg/sq. mm., for second stress —6,800 klg/sq. in. whereas, new ropes from the same factory:

1. Construction 6x7 of 42 wires, diam. ¾"

2. Construction 6x7 of 42 wires, diam. ⅝"

have shown the average elasticity modulus E—in the working load limit and higher to be, the first rope from 12,600 to 13,500 klg/sq. mm.; the second rope—from 13,-700—14,950 klg/sq. mm., that is, that they show moduluses considerably higher, which are nearing the "theoretical modulus" i.e. calculated by a theoretical formula.

✦ ✦ ✦

NEW ropes of our Moscow factory, made of wires of the same factory:

1. Construction 6x7=42 wires diam.—⅝"

2. Construction 6x7=42 wires diam.—⅝" (another sample)

have shown modulus E:

The first rope—from 9,550 to 10,420 klg/sq. in. Second rope —from 12,260 to 16,000 klg/sq. in.

✦ ✦ ✦

NEW ropes of a small diameter (Odessa factory) and which are made of many wires are showing the following average elasticity modulus:

(a) a rope of ½" diam. construction 6x27 of 162 wires, after being prestressed with one ton, i.e. 13.3% of breaking strength has a modulus of elasticity E equal to: 6,965—8,000 klg/sq. mm.

(b) Rope of 11 mm. diam., construction 6x30 of 180 wires after being prestressed with 2.25—2.5 tons, i.e. 50—60% of its breaking strength has modulus of elasticity value—E equal to:
from 6,675—7,870 klg/sq. mm.

(c) Rope of—8 mm. diam.—construction 7x19 of 133 wires after being prestressed with 2 tons, i.e. 62% of its breaking strength has a modulus of elasticity value—E equal to 10,430 klg/sq. mm.

(d) Three strand new rope, of 8.6 mm. diam. construction 3x27 of 78 wires, after being prestressed with 1 ton i.e. 27% of its breaking strength has a modulus E equal to 4,470 klg/sq. in.

✦ ✦ ✦

(4) BY comparison of these data, we learn, that ropes, which are fabricated of many wires (from 114—to 180) indirect of their diameter, have a comparatively low modulus of elasticity values.

ROPES made of a lesser number of wires than 6x7 construction have a bigger modulus of elasticity values E from 9,500 to 16,000 klg/sq. mm., indirect (independently) of the wire's material quality. These ropes are the most suitable for deep well pumping.

✦ ✦ ✦

BY comparison of the data of table 2 and the rope tension diagrams, it is clearly seen that:

(a) Low modulus ropes (mostly consisting of many wires) show a considerable elasticity modulus increase, by gradual increase of prestressing tension.

(b) High modulus ropes, at the same conditions of gradually increased prestressing tension kept the modulus approximately in constance, or change them slightly in this or the other way (see table 2).

✦ ✦ ✦

IF we will compare the rope's elasticity modulus values determined by us with theoretical formulas (proposed by some Russian engineers: Mr. G. Chopovsky and Prof. A. Dinnik) with the ones determined by us by the ropes tension diagrams, it will be seen that the first ones, for all the investigated ropes, will be considerably higher than the latter ones.

✦ ✦ ✦

THIS can be explained by the fact, that theoretical formulas; when concluded, do not consider an important phenomenon which takes place in the tension of a rope, i.e. tightening of its cross section and reduction of its diameter, resulting in a more tight approximity of its wires as well as of a closer relation of such strands to the hemp center of a rope and to the tightening (grip) of the hemp center itself.

✦ ✦ ✦

THE cross grip of a rope in tension is a summary deformation constituted of permanent and elastic ones. Therefore, the rope's elastic elongation takes place on account of the elastic elongation of separate wires and of the elastic grip of a rope cross section, which is considered as an elastic system of steel in wires. This is especially remarkable in new ropes, containing a great number of wires and which have not been in operation yet and therefore not yet stretched out. A thickening effect, which takes place in a rope, when it has a load on itself, increases with the increase of the load, and its duration. This explains the increase of a rope's modulus, by means of an increase in the number of loadings, which is observed by turning to tension diagrams and table 2.

✦ ✦ ✦

FROM this fact, the effectivity and usefulness of a preliminary rope's stressing is explained, with the view of increasing its modulus in such cases, where this is considered necessary as for instance, when using ropes for deep well pumping.

✦ ✦ ✦

PRESTRESSING of ropes can be safely made up to a certain range, which can be taken as the wires elastic limit. Practically, the prestressing of a rope can be carried out, up to some extent, during the fabrication process of the rope at the factory. The prestressing degree in this case depends on the size and power of machines used to fabricate the rope, together with knowledge and skill of fabrication. Prestressing of ropes to a greater extent can also be made after the rope has been fabricated, on special installations.

✦ ✦ ✦

THE practical significance of a ropes prestressing was calculated by American engineers, and they applied the theory in the building of the "Fort Lee Bridge" with a view to increasing the modulus of elasticity of a rope used for bridge construction.

✦ ✦ ✦

WE will briefly quote Mr. C. Sunderland*, chief engineer of Roebling & Sons Co., who made and erected the ropes for this bridge, as it adds and confirms some of our conclusions, regarding the investigation of wire ropes elastic properties, and indicates some practical results.

✦ ✦ ✦

A THREE span suspended bridge, with 3500 foot (1070 m.) main span, is sustained by two pairs of base wire ropes diam.—36″ (900 mm.), composed of wire ropes of $2\frac{5}{16}$″ diameter.

* "Engineering News Record", March 7, 1930.

TO hang these ropes on two steel bridge towers, two corresponding "foot bridges" were required, which were projected in the form of a three span temporary suspension bridge for the same spans. To correctly set the main ropes, on the height assigned by the bridge projection, it was necessary to erect "foot bridges" on the height corresponding to the project.

✦ ✦ ✦

IN view of the fact, that the new ropes are stretched out and given a structural stretch (elongation), the size of which can not be accurately predicted, it was also impossible to calculate the size of the "foot bridge" sag and this made the assembly of the bridge difficult.

✦ ✦ ✦

IT was therefore necessary to use ropes for the erection of the "foot bridges", with certain elastic properties and as great a modulus of elasticity in value (size) as possible.

✦ ✦ ✦

THE machines, which were necessary for the fabrication of ropes, were so constructed, as to make it possible to fabricate ropes under high tension, with a purpose of a more tight proximity of the wires in the strands. As no machine could make ropes of a $2\frac{5}{16}$″ diameter at a thickening stress, equal to a working tension (load) of 160,000 lbs. (72,500 klg), it was decided to stretch out these ropes, after they have been made, on a special installation, at a tension (load) higher than a rope's working tension (load), to eliminate, the structural elongation (stretch) of ropes.

✦ ✦ ✦

FOR new well constructed ropes with an independent wire rope center, Mr. Sunderland accepts a modulus of elasticity to be not higher than 12,000,000 lbs./sq. in. (8,440 klg/sq. mm.), which modulus the ropes used for erection of "foot bridges" had, despite the fact that for the wires of these ropes he accepts the modulus of elasticity to be from 25,000,000 to 27,000,000 lbs./sq. in. (17,570—19,000 klg/sq. mm.).

TABLE NO. 2

THE INVESTIGATIONS OF WIRE ROPES

MODULUS OF ELASTICITY DETERMINED BY TENSION DIAGRAMS

No.	Wire Ropes Firm's	Diam. of Rope	Breaking Strength in klg.		The numbers of consequent prestressing tensions													
					1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Odessa factory First sample	1¼"	51.000	A	10.0	10.0	15.0	15.0	20.0	25.0	25.5	30.0	40.0	40.0	45.0	45.0	45.0	50.0
				B	19.6	19.6	29.4	29.4	39.2	49.6	50.0	58.3	78.5	78.5	88	88	83	98
				C	5950	6950	6100	6270	6600	7680	7680	8470	12510	.....	10250	10250	10250	12300
1-A.	Odessa factory Second sample	1¼"	51.500	A	10.0	10.0	10.0	10.0	10.0	15.0	15.0	20.0	20.0	.....	.....	30.0	30.0	
				B	19.5	19.5	19.5	19.5	19.5	29.3	29.3	39	39	.....	.....	58.7	58.7	
				C	5810	6390	6390	6085	6085	6390	6240	6720	7110	.....	.....	9350	8000	
2.	Odessa factory	1⅛"	39.000	A	7.0	7.0	10	13	17	22	28	31.5						
				B	18	18	25.6	33.3	43.5	56.3	71.8	80.8						
				C	6800	6800	7290	7290	6600	5670	7290	9280						
									7550	7650	9540	10700						
3.	Odessa factory First sample	¾"	17.700	A	3.5	5.0	7.0	9.0	11.0	13.0	15.0	17.0						
				B	19.8	28.2	39.6	60.8	62	73	87	96						
				C	12600	12050	11950	12020	12340	12180	12140	11900						
3-A.	Odessa factory Second sample	¾"	17.750	C	13525	13325	13525	13900	13400	12800	12500	13200						
				C			13650	13900	13400	12800	12500							
4.	Odessa factory First sample	⅝"	13.550	A	3.0	5.0	7.0	9.0	11	12	13							
				B	22	37	37	66.5	81	89.5	96							
				C	13700	14700	14740	15000	14050	12840	13350							
				C	13700	15950	14740	14870	15950	14500	15920							
4-A.	Odessa factory Second sample	⅝"	13.500	C	14950	15300	14230	14350	14600	13050								
5.	Odessa factory First sample	½"	7.380	A	1.0	2.0	3.0	4.0	5.0	6.0								
				B	13.3	26.7	40.0	53.3	66.6	89.3								
				C	6965	9690	10000	11050	12900	13350								
5-A.	Odessa factory Second sample	½"	7,620	A	1.0	2.0	3.0	4.0	5.0	5.5	5.5	6.0						
				B	13.1	26.2	39.4	52.5	65.5	42.2	42.2	78.7						
				C	8000	10000	10420	11220	11430	12120	12320	13150						
6.	Moscow factory First sample	⅝"	13.000	A	3.0	5.0	7.0	9.0	11.0	12								
				B	23	38.4	54	69	84.5	92.5								
				C	9550	9600	11470	11850	12900									
6-A.	Moscow factory Second sample	⅝"	12.980	C	10420	10600	11240	11125	11470	11460								
7.	Moscow factory First sample	⅜"	15.300	A	2.0	4.0	6.0	8.0	10.0	12.0	14.0							
				B	13.3	26.7	40	53	66.6	80	93							
				C	12260	13470	11790	12380	12250	12100	12220							
7-A.	Moscow factory Second sample	⅝"	14.750	A	3.0	5.0	7.0	9.0	11.0	13.0								
				B	20	33.3	46.7	60	73	86.7								
				C	16050	15920	15320	15890	15250	14600	12700							
8.	Leningrad factory First sample	⅝"	11.640	A	2.0	5.0	10.0	11.0										
				B	16.7	41.7	83	91.5										
				C	4500	8500	10525	11850										
8-A.	Leningrad factory Second sample	⅝"		A	2.5	2.5	2.5	2.5	2.5	2.5	4.0	4.0	4.0	6.0	6.0	8.0	8.0	
				B	20	20	20	20	20	20	32	32	32	48	48	64	64	
				C	5510	5425	5700	5990	6320	6420	6085	5935	6260	6085	5375	7230	7460	
9.	Odessa factory Old rotary drilling rope	1⅛"	39.000	A		7.0	10.0	10.0										
				B		18.0	25.6	25.6										
				C	8150	10400	10400	10400										
9-A.	Odessa factory Old rotary drilling rope Second sample	1⅛"	39.000	A		7.0	10.0											
				B		18	25.6											
				C	10750	10200	9550											
10.	German make Old rope	⅜"	4.910	A		2.0	2.5	3.0	3.5	4.0	4.5							
				B		40.7	50.7	61	71	81.5	91.7							
				C	8620	10060	11420	11500	11550	11850	12580							
11.	Three strands New rope	$\frac{5}{16}$"	3.660	A		1	1	1.5	1.5	1.5	2	2	2.5	2.5	3.0	3.0	3.5	
				B		27.2	27.2	41	41	41	54.6	54.6	68.3	68.3	82	82	95.5	
				C		4470	4470	6760	6760	6760	8670	8670	8125	8770	9720	10380	11620	
				C		4470	4470	6170	6170	6170	7400	7400	6890	7590	9250	9250	10580	

NOTE: A—Prestressing tension in metric tons
B—Prestressing tension in % from Breaking Strength of a rope
C—Average value of Modulus of Elasticity in kg/mm.^{2}

TABLE NO. 1

A DESCRIPTION OF INVESTIGATED WIRE ROPES

No. in order	Firm	Diameter of Wire Rope in.	Construction and Direction of Lay of Rope	Construction and Direction of Lay of Strand	Total number of wires in rope	Average diamet. of Wire mm.	Total Cross Section of all wires sq. mm.	Number and material of incenter	Weight of rope in klg. per m.
1.	Odessa factory	1¼"	Regular Lay left	6x19 right 1+ 6+12	114	2.11	399	1-Hemp	3.55
2.	" "	1¼"	" " "	6x19 right 1+ 6+12	114	2.09	391	1-Hemp	3.45
3.	" "	1⅛"	" " "	6x19 right 1+ 6+12	114	1.82	294.5	1-Hemp	2.62
4.	" "	¾"	" " right	6x 7 left 1+ 6	112	2.02	134.5	1-Hemp	1.17
5.	" "	⅝"	" " "	6x 7 left 1+ 6	42	1.78	104.5	1-Hemp	0.937
6.	" "	½"	" " "	6x27 left 1+11+15	162	0.70	62.4	1-Hemp	0.57
7.	Moscow factory	⅝"	" " "	6x 7 left 1+ 6	42	1.83	109.0	1-Hemp	0.97
8.	Moscow factory another make	⅝"	" " "	6x 7 left 1+ 6	42	1.84	111.3	1-Hemp	0.945
9.	Leningrad factory	⅝"	" " "	6x 7 left 1+ 6	42	1.81	108	1-Hemp	0.98
10.	Odessa factory old Rope	1⅛"	" " left	6x19 right 1+ 6+12	114	1.80	290	1-Hemp	
11.	Odessa factory old Rope	1⅛"	" " "	6x19 right 1+ 6+12	114	1.81	293	1-Hemp	
12.	German make old Rope	⅜"	" " right	6x29 left 4+10+15	174	0.50	34.8	1-Hemp	
13.	New three strand Rope. Unknown make	$\frac{5}{16}$"	" " "	3x26 left 1+10+15	78	0.70	30.4	Without center	

THE prestressing of these ropes was made during ten hours at a stress of 200,000 lbs. i.e. on 125% higher than the most working tension (load) equivalent to 160,000 lbs. Such a long period of prestressing secured a uniform elastic elongation, beyond the limits of 160,000 lbs. working tension (load).

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THE same result, according to Mr. Sunderland's opinion could be obtained, by means of a tension equal to 250,000 lbs., but at a shorter duration (period of time). The average modulus of elasticity for a rope prestressed by this method, was determined to be equal to 18,000,000 lbs./sq. in. (12,650 klg/sq. mm.) as the average one from 27 tests, where as the initial modulus of elasticity was 12,000,000 lbs./sq. in. (8,440 klg/sq. mm.) i.e. an increase of elasticity modulus on 50% has been observed.

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FROM the information, stated above, two interesting and important facts can be derived:

First: That American new ropes of a good construction and with an independent wire rope center have a modulus of elasticity not in excess of 12,000,000 lbs./sq. in. (8,440 klg/sq. mm.) when first stressed, i.e. a value higher, than a modulus of elasticity value for wire ropes of 6x19 construction with diameter 1¼" and 1⅛", a lower, than modulus of elasticity of wire ropes of 6x7 construction with diameter ¾" and ⅝".

Second: In order to have high modulus wire ropes, it is necessary to use the multiple stressing of new ropes, or to use for this purpose the old used ropes. The above data from Mr. Sunderland concerning wire ropes modulus of elasticity values, and the effect of ropes prestressing on their elasticity modulus values, are in full accordance with the results obtained by the author from his investigation of the mechanical properties of wire ropes.

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Controlled Atmosphere Applications To Heating of Ferrous and Non-Ferrous Metals

By T. B. Bechtel

Engineer, The Electric Furnace Co., Salem, Ohio

A discussion of present practice in the application of controlled atmosphere to the heat treatment of metal products. Part I.

OXIDE formation on metals raised to elevated temperatures is governed, for the most part, by time, temperature and atmosphere.

✦ ✦ ✦

TIME and temperature are usually fixed by the requirements of the heating operation, so that atmosphere is the only remaining variable or factor with which to work in the elimination or control of scale formation.

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Requirements and Application of the Controlled Atmosphere Gases

THE use of controlled atmospheres in heating operations on metal products is, of course, not new. Typical examples which may be cited are the use of natural gas, and in some cases producer gas (either of which may or may not have been slightly modified) in the box annealing of steel sheet or strip; of hydrogen or nitrogen in certain cases; and of steam in the annealing of copper. These gases all have certain inherent drawbacks, such as the expense of either hydrogen or nitrogen, the problem of "sooting" resulting from the use of uncracked natural gas, the wetness of product protected from oxidation by a steam atmosphere, etc.

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AS concerns the use of the modern type of controlled atmosphere, however, the application is comparatively new, a development of the past 3 or 4 years, at the most, in actual commercial usage. The major requirements of this type of controlled atmosphere may be generally visualized as contrasted to the objections set forth above to the use of gases mentioned as typical of older practice. This new form of controlled atmosphere is the product of partial combustion of suitable gases usually containing considerable portions of hydrocarbons or of hydrogen plus hydrocarbons, with a deficiency of air as compared to that required for complete combustion.

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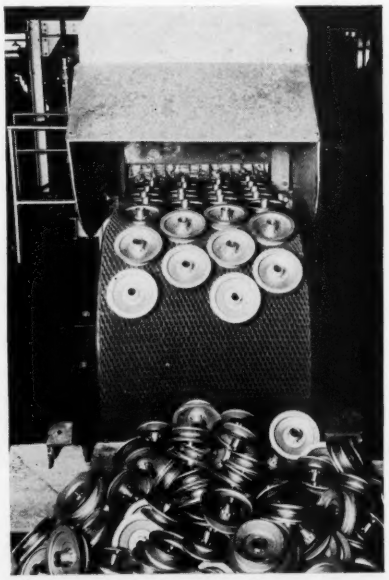
THE produced controlled atmosphere gas may be easily varied over a comparatively wide range, but for practical applications the analysis, as concerns the important reducing constituents will usually be within the following limits:

H_2 — 2 to 18%

CO — 3 to 11%

It is important, for universal application, that the basic materials required in the production of the controlled atmosphere be readily available. Since city gas, and natural gas from private or public service companies mains, and liquified hydrocarbon gases such as Butane, Propane, etc. have all been used successfully as bases for the production of the types of controlled atmospheres under discussion, it may be seen that the problem of availability is solved for the major portion of American industry.



Fan pulleys and miscellaneous other automotive and refrigerator parts are brazed in this special atmosphere, continuous, conveyor type, copper brazing furnace. ✦ ✦ ✦ ✦ ✦

✦ ✦ ✦

AS regards expense, it must be brought to mind that cost of usage is determined not only by the cost of producing the controlled atmosphere, but by its application to the furnace as well. Therefore, type and construction of furnace equipment are important considerations in the usage cost of controlled atmosphere gases. These matters, however, will be discussed later. For the present we may indicate the relatively low cost of the gas itself as being within the limits of 5c and 20c per M cu. ft. These costs are based upon supply or base gas costs of 40c per M cu. ft. with natural gas, and 70c per M cu. ft. with city gas, and are dependent upon the percentage of air used. These figures would be sufficient to include the auxiliary costs of electricity and water, in most cases, but not of maintenance charges, which are negligible, nor of fixed charges which are also low, due to the comparatively modest investment required for the cracking unit.

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SOME mention may also be made of controlled atmosphere produced by the cracking of natural or artificial gas in the presence of steam, and by the disassociation of ammonia. These, however, do not hold an important place in the picture, due to several reasons, among which are relative complexity of the apparatus required or high cost of the resultant product.

Controlled Atmosphere Applications

THE major benefits of controlled atmosphere will appear in those operations in which both heating and cooling are carried on within the furnace, or in auxiliary equipment closely linked thereto, as contrasted to hot rolling or forging operations. The reasons may be readily seen and need not be detailed.

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HENCE the economic use for controlled atmosphere will be found to lie largely in the fabricating and finishing fields; more particularly on cold finished parts but also with some important applications to hot worked products. There are now many applications of controlled atmosphere in successful operation in these fields. Therefore, it has been considered that the description of a few of these applications would serve a useful purpose at this time.

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Annealing of Cold Drawn and Stamped Products

IT is quite evident that it is desirable, when products are cold drawn, to preserve the surface conditions resultant from cold working. Work hardness, however, must be relieved, in a considerable portion of the cold worked products, either for further processing, or to put the metal in condition for final fabrication, and for this, annealing operations are required. Hence, the use of controlled atmosphere annealing equipment here may serve a very useful purpose. Typical products produced by cold drawing are wire and seamless tubing.

STAMPINGS may also come into somewhat the same classification, both due to the great care taken in the preparation and preservation of surface condition of the sheet or strip from which the stampings are made, and in the method of cold working. Here again a certain portion of the product, i. e., the more difficult parts must be annealed between draws.

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CONTROLLED atmosphere equipment for the above is usually of the continuous type as applied to cold drawn tubing and to stampings and, therefore, are ordinarily electrically heated. Wire annealing equipment is usually of the batch type, and since a retort or pot is necessary to the operation as a whole, it depends on the economics of the case as to whether the furnace equipment should be fuel-fired or electrically heated. Non-ferrous wire, however, is being bright annealed in continuous furnace equipments, and of course, this is possible in the case of steel wire also, depending upon the requirements of the operation.

✦ ✦ ✦

WHILE discussing the heating of these several products in controlled atmospheres, it may be well to point out the effect of die and press lubricants upon the final surface conditions of the annealed products. If these lubricants are heavy and contain a considerable portion of solids, they will not be removed in the anneal so that the resultant surface will be better described as "Semi-bright" or "clean", rather than "bright". In the case of stampings, some jobs may require a wash prior to annealing to deliver the desired degree to brightness as annealed.

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ANOTHER point that may be brought up here in connection with stampings, particularly concerns the non-desirability of controlled atmosphere annealing rather than its use. In certain products which must finally be pickled in any event, process anneals in controlled atmosphere are neither necessary nor of value. In this case, atmosphere control, as contrasted to controlled atmosphere, and as may be achieved in well designed fuel furnaces, will produce an annealed surface, which, though somewhat oxidized, will have no evidence of loose scale which would be detrimental to die life, and which therefore, fulfills the requirements of the case.

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Scale-Free or Bright Hardening

IN the case of many small parts, such as bolts, pins, bushings, forgings, etc., which are heat treated in the final machined state, it is again quite apparent that heat treatment in controlled atmosphere will serve a useful purpose. The elimination of scale, preservation of dimensions, elimination of the necessity for a cleaning operation, and better appearance of product result from controlled atmosphere heating.

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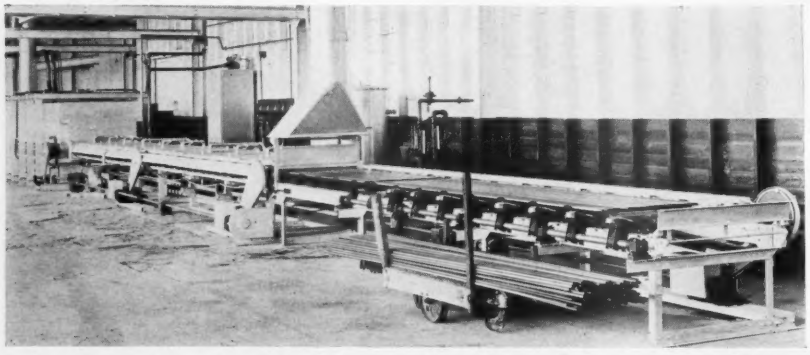
PROBLEMS arise in this connection concerning the requirements of the quenching operation, and the nature of the quenching medium, generally either water or oil. With suitable care in furnace design or in the arrangement of handling equipment, however, these problems are being met with a high degree of satisfaction. In oil quenched parts, especially those of appreciable size, the surface may be blackened by the quenching oil in contact with the hot metal, but this is not at all detrimental to the product, either as concerns usefulness or appearance, and in some cases may be of value, as it serves somewhat as a rust preventative, if the parts must be stored for a considerable period.



Cold drawn, seamless steel tubing in various diameters and lengths is bright annealed continuously in this controlled atmosphere conveyor type furnace. The special atmosphere generator is shown in rear.

Controlled Atmosphere Annealing of Hot Rolled Products

HOT worked products are of course not susceptible to "bright" annealing in the ordinary sense of the word. If the scale, however, is in the proper condition, as for example in certain classes of hot rolled sheet, it appears that a continuous anneal in the presence of a controlled reducing atmosphere will deoxidize the surface oxide, with a tightly adherent resultant surface. Such surface appears, experimentally, to be very suitable to subsequent coatings.

✦ ✦ ✦

IN the heat treating of hot rolled rod, for cold heading purposes, the material is annealed in the condition in which it is received from the hot mills and later cleaned and drawn to size. Under these circumstances it is, of course, not possible to bright anneal, and neither is it desirable to deoxidize the mill scale, since this would make the cleaning more difficult. It has, however, been found of value to provide a controlled atmosphere of such proportions that the rod surface is maintained in substantially the same condition as received from the mill, with the exception that it has been somewhat loosened by the effect of the heat treatment. By this means the time for pickling has been substantially reduced, and the elimination of pitting has, of course, been found to be beneficial to the surface condition of the rod, and the resultant wire.

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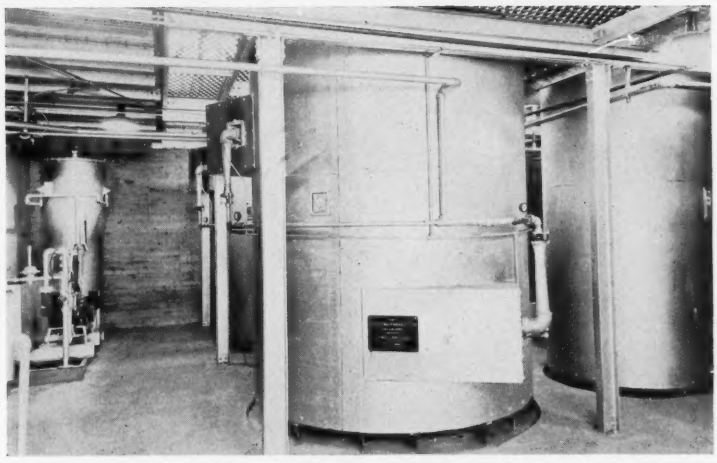
Bright Annealing of Cold Rolled Strip

COLD rolled strip is another important product to which controlled atmosphere has been applied. However, much has been printed in the technical press in general regarding this operation, both continuously and in batch, that it is unnecessary to go into the matter further, at this time. An illustration of one of the first successful continuous installations for this process is shown here. Several other interesting installations have since been made for this process.



Pit type furnaces for bright annealing wire. The Elfurno gas generator at left provides the special atmosphere used in this equipment.

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Continuous Brazing

ANOTHER of the widely used applications of controlled atmospheres concerns the joining of steel parts, such as assemblies of stamped pieces; or machined parts with stampings; or of machined assemblies, in continuous production. Briefly described, the method is to apply a non-ferrous brazing medium in one of several forms to the assembly of parts, and pass the assemblies continuously through a heating furnace at temperature high enough to melt the brazing medium. Controlled atmosphere is employed to prevent oxidation both of molten brazing medium and of steel surfaces. Cooling to practically room temperature is also carried out, usually in a forced cooling extension attached to the heating chamber. The cooling chamber also contains the protective gas atmosphere since it is usually desirable to deliver the brazed assemblies with clean and bright surface conditions. The result is a very strong joint, and at the same time production costs are in most cases sharply cut.

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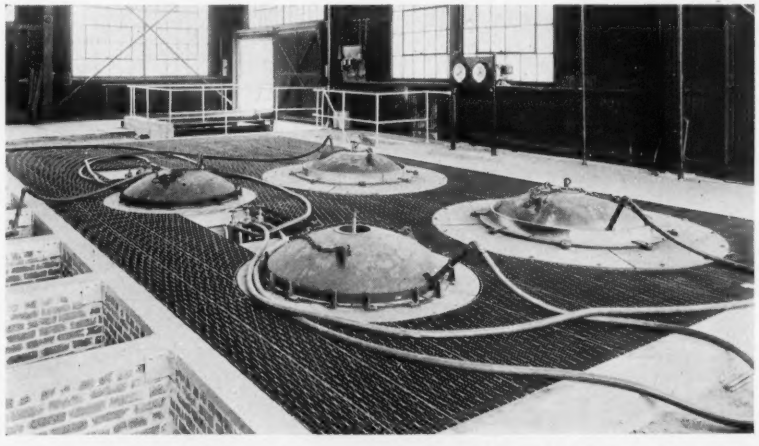
SUCH furnaces have come into extensive application in the production of refrigerator parts, in a wide variety of parts entering into automotive construction, and in various branches of the steel stamping industry. Novel applications are in the production of watches, of other jewelry, and of the new type of radio tubes where steel shells or bulbs are used in place of glass. Continuous, controlled atmosphere brazing is bound to come into much more extensive use as mechanical designers in general become familiar with its advantages.



Pit type furnace installation for clean normalizing, spheroidizing and bright annealing steel wire and rod in coils.

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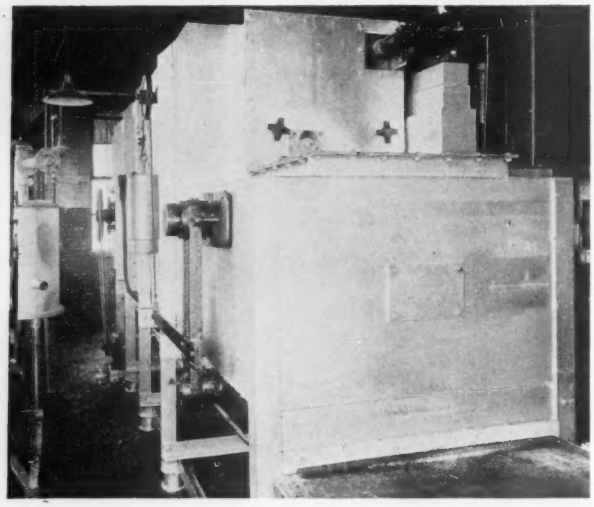

A special atmosphere, continuous, chain belt conveyor type furnace for scale-free heat treating and clean and bright hardening. ✦ ✦ ✦

Equipment Necessary for the Production of Controlled Atmosphere

AS concerns the equipment necessary for producing the atmosphere described above, it may be noted that the requirements are such that the apparatus should be capable of operation with a minimum of care and attention, once it has been started up. It may be desirable, in certain instances to be able to vary the analysis of the produced gas, as applied to a particular furnace or operation, although this is generally not the case. It may also be desirable in periods of low production, or intermittent operation, to be able to shut down and start up the equipment easily and quickly. The units should also be so arranged that the component parts be readily available for the ordinary maintenance operations such as oiling or greasing, cleaning, inspection, etc., and provided with sufficient gauges and other indicators so that operating conditions may be readily checked.

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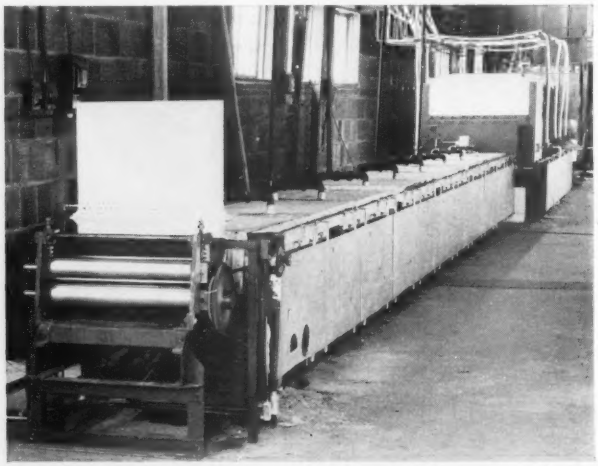
AS may be imagined, load conditions attendant upon the operation of these generators are, in the main, fairly constant, particularly in connection with continuous furnaces, but provision should also be made to maintain constant pressure conditions, in the controlled atmosphere unit, over the entire output range.



A special atmosphere furnace for bright annealing cold rolled steel strip continuously. The material is delivered to the furnace in coils, uncoiled at the charging end and conveyed at a relatively high rate of speed through the heating and cooling chambers in a special atmosphere and recoiled at the discharge end. ✦ ✦ ✦ ✦ ✦ ✦

AS developed for the above requirements, the equipment for the generation of the controlled atmosphere gas is relatively simple in design, and very reliable in operation, in addition to which its first cost is quite moderate.

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Furnace Equipment

AS concerns the furnace equipment the major requirements are that neither infiltrating air nor products of combustion be permitted to contact the metal being heated, and that the equipment be arranged for minimum usage of the controlled atmosphere gas.

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THE electric resistance furnace is inherently most suitable for the use of controlled atmosphere, for several reasons among the most important of which are: First—That means to insure gas tightness may be confined to the outer shell, or binding of the furnace, which is, of course, not subjected to the effects of high temperatures, and tightness is, therefore, more easily accomplished and more reliably maintained; second, —that direct, or unmuffled heat condition for uniformity both throughout the heating chamber and with reference to temperature gradient between heat source and receiving bodies.

✦ ✦ ✦

DIRECT firing of fuel-fired furnaces will not satisfy the requirements of those applications in which the use of controlled atmosphere is indicated, one of the main reasons being that both water vapor and carbon dioxide are oxidizing agents, when in contact with heated steel surfaces, and both are combustion products in normal furnace operation. Other considerations such as those concerning the necessity of openings in the furnace for vent ports, and their effect upon air infiltration control, etc., are also factors. Therefore, the fuel furnace, as used in controlled atmosphere work must have an intervening barrier, such as a retort, a muffle, or a multiplicity of combustion tubes interposed between heat source and work.

(*Please turn to page 201*)

Outstanding Personalities of the Wire Industry

Phillip M. McKenna

PHILLIP M. McKenna has been appointed Vice-President of Vanadium-Alloys Steel Company by action of the Board of Directors of that company on February 11, 1936.

✦ ✦ ✦

MR. McKenna was previously research director for the company and his particular interest in the past ten years has been the development of hard compositions for drawing dies and tools.

✦ ✦ ✦

HE is a graduate of George Washington University and has spent most of his life in studying the chemistry and metallurgy of rare metals. From 1916 to 1925 he was Vice-President and General Manager of the Chemical Products Company of Washington, D. C.

✦ ✦ ✦

Ray W. Doering, Works Manager Frost Steel & Wire Co. Ltd. Hamilton, Canada

IT is with great regret that we announce the death of **Ray W. Doering**, Works Manager of the Frost Steel & Wire Co., Ltd., of Hamilton, Canada, one of the members of The Wire Association.

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MR. Doering prior to 1915 was formerly with the Frost Wire Fence Co., of Cleveland, Ohio. In 1915 he went to the Frost Steel & Wire Company of Hamilton as assistant superintendent; was appointed general superintendent in 1918 and in 1929 was appointed works manager and vice-president.

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MR. Doering was very active in church work and was senior warden of Strict Observance lodge, A. F. & A. M., and a member of Murton Lodge of Perfection, A. & A. S. R.; Hamilton Chapter Rose Croix, and Moore Consistory, A. & A. S. R., and had served as past president of the Optimist Club and on the directorate of the Y. M. C. A.

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C. E. Stryker

C. E. Stryker, formerly chief engineer of the Fansteel Metallurgical Corporation and of the Vascoloy-Ramet Corporation, and a former member of The Wire Association, is now associated with McKinsey, Wellington & Company, a management engineering organization located in Chicago.

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R. J. Southwell

R. J. Southwell, who was for many years associated with Wickwire-Spencer Steel Company, is now connected with American Chain Company, Inc. and Associate Companies in the capacity of Sales Engineer. His headquarters will be at Bridgeport, Connecticut.

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E. E. Reagle

E. E. Reagle, superintendent of the Sharon plant of the Sharon Steel Hoop Company has been appointed superintendent of all plants for the company. **Walter S. Jackson** has been made superintendent of the Sharon Plant, and **Lloyd L. Wilson** has been named superintendent of the strip mill department. **James May**, formerly production manager at Sharon, has been appointed assistant to Mr. Reagle.

Make your plans now to attend the Wire Association meetings, Cleveland, O., Oct. 19-23, 1936

Walter J. Dennis

MR. Dennis has recently been placed in charge of applications of drawing dies and mandrels of the Vascoloy-Ramet Tantalum Carbide compositions marketed by the Vanadium-Alloys Steel Company, Pittsburgh. He has been in the die industry for the past eight years and is a member of the Wire Association.

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Dr. John F. Thompson

DR. John F. Thompson for the last five years the sole vice president of the International Nickel Company of Canada, Ltd., has been made Executive Vice President, and **Dr. Paul D. Merica,** formerly assistant to the president, **Donald MacAskill,** general manager in charge of Canadian operations, and **D. Owen Evans,** director of the Mond Nickel Company, Ltd., have been elected vice presidents.

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Joseph H. Carter

JOSEPH H. Carter, formerly plant superintendent for the Sharon Steel Hoop Company at Lowellville, has been appointed general superintendent of the Pittsburgh Steel Company's plants at Pittsburgh, and **R. C. Butler** has been appointed blast furnace superintendent. Mr. Butler formerly oc-

(*Please turn to page 200*)

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Jan. 1936 and Jan. 1935
(In gross tons)

	Jan. 1936	Dec. 1935	Jan. 1935
Wire rods	3,939	2,943	3,279
Hoops, bands and strip steel	4,954	3,401	2,772
Plain black or galvanized iron or steel wire	5,030	3,177	3,220
Barbed wire and woven wire fencing	1,744	3,411	3,724
Woven wire screen cloth	74	103	100
Wire rope	409	259	231
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	365	1,117	365
Wire nails	675	1,055	783
Tacks	34	16	36
Other nails, including staples	153	183	239
Bolts, machine screws, nuts, rivets and washers	461	481	438
Total, these 11 classifications	17,838	16,146	15,187

Imports of Iron and Steel Wire Into the United States
(In gross tons)

Concrete reinforcement bars	131	362	109
Hollow bars and drill steel	205	93	50
Merchant steel bars	.....	.....	.....
Wire rods	1,974	1,287	775
Barbed wire	2,237	2,192	1,684
Round iron and steel wire	447	337	415
Telephone and telegraph wire	.....	.....	.....
Flat wire and strip steel	232	192	112
Wire rope and strand	185	278	193
Other wire	109	145	146
Hoops and bands	1,899	2,140	2,207
Nails, tacks and staples	2,177	2,114	993
Bolts, nuts and rivets	18	22	36
Total, these 13 classifications	9,614	9,152	6,720

Exports of Insulated Wire and Cable, January, 1936

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Insulated iron or steel wire and cable	5,541	$ 1,232	249	$ 131
Rubber-covered wire	351,545	76,246	61,280	11,513
Copper weatherproof wire	148,266	19,236	46,602	7,726
Copper telephone cable	18,528	5,152	12,950	2,200
Other insulated copper wire	329,670	65,824	195,786	30,277
Nickel-chrome electric resistance wire	16,455	20,471	574	599
Total, these 6 classifications	870,005	$188,161	317,441	$52,446

Exports

EXPORTS of semi-finished and finished iron and steel products from the United States during January aggregated 82,602 gross tons and represented a decline of 8.9 percent from the December total, but an increase of 7.8 percent when compared with shipments made during the corresponding month of 1935.

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NORTH and Central America and the West Indies represented the leading area in the receipt of semi-finished and finished iron and steel products shipped from the United States during the month reviewed. Exports to that area amounted to 30,080 gross tons to account for 36.4 percent of the aggregate (34.4 percent in December 1935). The Far East—next ranking—received shipments to the extent of 23,463 tons, or 28.4 percent of the total (28.7 percent). Following was South America whose purchases—15,425 tons—accounted for 18.7 percent (18.2 percent). Sales to Europe (7,850 tons) were next in importance and represented a proportion of 9.5 percent (12.7 percent) with African purchases—5,784 tons—accounting for 7 percent (6 percent) and continuing in their role of least importance.

Canada Leading Individual Market During Month

SHIPMENTS totaling 17,279 tons were dispatched to Canada during the month, thus marking it as the leading individual outlet for semi-finished and finished iron and steel items from the United States. The chief products moving in the varied sales to that market were black steel sheets (4,408 tons), hot-rolled strip steel (2,008), 'other steel bars' (1,820), plain shapes (1,605), cold-rolled strip steel (1,323), and iron castings (812). Japan's purchases (totaling 5,778 tons) followed, and were mostly of tin plate and taggers' tin (2,386), wire rods (2,346), plain shapes (469), and 'other steel bars' (386). China—the third market—received 5,733 tons of American iron and steel products of which the predominating ones were tin plate and taggers' tin (2,499), heavy rails (1,709), wire rods (501), and galvanized wire (215). Next was the trade with the Philippine Islands—5,211 tons—predominated chiefly by galvanized steel sheets (2,624), black steel sheets (428), tin plate and taggers' tin (282), wire rope (261), galvanized steel welded pipe (248), and black steel welded pipe (226). Mexico was the next best customer with a trade amounting to 4,468 tons made up principally of black steel sheets (1,256), tin plate and taggers' tin (981), black steel welded pipe (290), barbed wire (277), galvanized steel sheets (223), and cast-iron pressure pipe and fittings (221). Brazil followed receiving shipments to a total of 4,211 tons, the outstanding items being tin plate and taggers' tin (1,165), plain wire (845), black steel sheets (645), galvanized steel sheets (420), barbed wire (223), and plain shapes (169).

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THE principal outlets for scrap were Italy (58,785 tons); Japan (53,733 tons); United Kingdom (30,909 tons); Yugoslavia (6,055 tons); the Netherlands (2,416 tons); and Poland (2,192 tons).

Downward Movement in Import Trade Continues

SINCE November 1935, a downward curve has been observed in the iron and steel import trade of the United States, and that trend continued during January when a total of 50,489 tons was received from foreign suppliers. Compared with the previous month, there was a decline of 5.9 percent in total receipts, but when considering the January, 1935 trade, a sharp gain (123 percent) occurred.

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PIG iron continued to be the outstanding item imported on a tonnage basis, the 15,033 tons received, coming chiefly from the Netherlands (4,511), Soviet Russia (3,720), British India (3,631), Germany (1,608), and the United Kingdom (932). Scrap followed and its total of 7,714 tons came mostly from Canada (6,711) and the Netherland West Indies (922). The bulk of the structural shapes imported (4,679 tons) originated in Belgium (2,748), France (1,081), and Germany (850). Bars, whether solid or hollow were received to a total of 3,055 tons, the outstanding suppliers being Belgium (1,555), France (769), Sweden (331), and Germany (282). Next in importance was ferro-manganese, the total of 2,248 tons being practically all purchased from Norway (1,996), and France (252). Receipts of barbed wire amounted to 2,237 tons and came principally from Germany (2,033), and the Netherlands (158). Nails, tacks, and staples (2,177 tons), were practically all imported from Germany (1,914) and Belgium (254).

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Sources of January Import Trade

GERMANY was the outstanding supplier of iron and steel products to the United States during January (from the standpoint of tonnage) with sales aggregating 11,693 tons. Barber wire (2,033 tons) was the chief product in this trade, followed by nails, tacks, and staples (1,914), 'other pipe' (1,762), pig iron (1,608), and sheets, skelp, and saw plate (1,185). Receipts from Canada (8,370 tons) were next in importance and were made up chiefly of scrap (6,711), and spiegeleisen (1,481). Next came Belgium with sales aggregating 7,447 tons, of which the principal products were structural shapes (2,748), bars, whether solid or hollow (1,555), other hoops and bands (1,155), sheets, skelp, and saw plate (799), and pig iron (529). The trade of the Netherlands (4,672 tons) was practically all confined to pig iron (4,511) as was that of the Soviet Union (4,204 tons) which sent in 3,720 tons of pig iron. The participation of British India (3,631 tons) was all of pig iron. Sweden—with a varied trade aggregating 3,378 tons—was the seventh supplier in the month's trade, with wire rods (1,429) the outstanding product. Following were round iron and steel wire (366), bars, whether solid or hollow (331), sponge iron (308), and 'other pipe' (306).

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CARD clothing imports amounted to 12,428 square feet valued at $17,786—approximately the November 1935 level—and recorded a decline (of 3598 square feet and $4,443) from the December totals. The United Kingdom (10,006 square feet valued at $13,420), Germany (2,320 square feet valued at $3,693), and Switzerland (102 square feet valued at $673) covered this trade.

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DECREASED trade was recorded in **wire cloth and screening** receipts (81,848 square feet) when compared with the previous month (103,820 square feet). The suppliers were Germany (48,032 square feet), the Netherlands (19,507 square feet), and Canada (14,309 square feet).

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FOURDRINIER and other paper-making wires were received to the extent of 26,161 square feet, a decline of 32 percent under the total for December. This amount was sent in by Austria (11,614 square feet), Germany (9,254 square feet), Sweden (3,729 square feet), and France (1,564 square feet).

WIRE heddle imports amounted to 200,000 pieces, a very sharp decline (89 percent) from the previous month's total. The only supplier was France.

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IMPORTS of **wire fencing and netting** (galvanized before weaving) veered upward sharply to a total of 301,500 square feet and registered 75 percent higher than in the previous month. The Netherlands was the sole source of supply. Of the galvanized after weaving grade, a decline (38 percent) occurred when a total of 2,802,530 square feet came in from Germany (1,160,000 square feet), Belgium (1,022,230 square feet), and the Netherlands (620,300 square feet).

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EXPORTS of iron and steel wood screws during January, 1936 totaled 31,398 gross valued at $5,091. Of this total the Union of South Africa took 8,900 gross valued at $814; Nicaragua 5,839 gross valued at $657; Argentina 4,277 gross valued at $486; Philippine Islands 4,131 gross valued at $1,231; Cuba 1,774 gross valued at $221; Bolivia 1,358 gross valued at $255; Japan 1,100 gross valued at $146; Mexico 934 gross valued at $212.

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EXPORTS of brass wood screws during the same period amounted to 3,677 gross valued at $1,307. Of this total Canada took 876 gross valued at $553; Argentina 757 gross valued at $144; Dominican Republic 380 gross valued at $73; Philippine Islands 370 gross valued at $112; Bermuda 292 gross valued at $95; Honduras 233 gross valued at $77; Costa Rica 200 gross valued at $39.

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IMPORTS of wood screws during the same period amounted to 53,587 gross valued at 3,641, of which amount Sweden supplied 23,485 gross valued at $1,799; Japan 19,200 gross valued at $1,127; Belgium 7,050 gross valued at $322; Germany 3,357 gross valued at $264.

A Review of Recent Wire Patents

No. 2,029,546, INSULATED CONDUCTOR, Patented February 4, 1936 by Rudolph A. Schatzel, Rome, N. Y., assignor to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

About the wire conductor are a number of overlying layers of helically wrapped paper tape, the adjacent layers being separated by thin layers of viscous sealing material, and about these paper layers is a continuous thick layer of non-hardening, oxidized, moisture-resistant, plastic compound.

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No. 2,029,953, WIRE REEL, Patented February 4, 1936 by John R. Sutilef, Lapine, Oregon.

The construction includes side bars, with plates secured to the rear ends of the bars, one of the plates being imperforate and the other plate having an opening. To the inner side of the plate are secured blocks having central openings with an axle inserted through the openings in the blocks with one end of the axle abutting the imperforate plate. A lever is pivoted to one of the plates below the opening and held thereacross by a spring but which lever may be retracted to one side of the opening.

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No. 2,030,165 to 2,030,171, RIVETS & METHOD OF SETTING THE SAME, Patented February 11, 1936 by Louis C. Huck, Grosse Pointe, Mich., assignor to Huxon Holding Corporation, Detroit, Mich., a corporation of Michigan.

The first five of these patents cover various forms of rivets while the last two patents are specific to the method of manufacturing rivets.

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No. 2,030,616, WIRE-CLOTH SEAM AND METHOD OF MAKING SAME, Patented February 11, 1936 by Nelson W. Webb, Belleville, N. J., assignor to Eastwood-Nealley Corporation, Belleville, N. J., a corporation of N. J.

A method is provided which consists in preparing the wire cloth-ends for soldering together edge to edge by replacing the last weft wire of each cloth-end with a solder-coated wire, the warp wires being cut off so that the side of its solder-coated wire projects beyond their cut ends, the latter extending beyond the axis of the solder-coated wire,

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

and then applying heat to solder the warps to the solder-coated wires and the latter side by side to each other.

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No. 2,030,764, COIL WINDING MACHINE, Patented February 11, 1936 by Lora E. Poole, Anderson, Ind., assignor by mesne assignments to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

This machine is adapted for winding wire in coiled form upon forms, which carry the coil permanently. In the operation of the machine the form is rotated after the end of the wire has been secured thereto.

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No. 2,030,803, COMPRESSING DEVICE, Patented February 11, 1936 by Robert Temple, Jr., Denver, Colo., assignor to Robert Temple, Inc., Denver, Colo.

This device is adapted for compressing metal joint sleeves on the ends of cables and wires, both solid or stranded.

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No. 2,030,977, MAIL EYE CLINCHING DEVICE AND METHOD OF FORMING COTTON HARNESS HAVING METAL EYES, Patented February 18, 1936 by Samuel R. Floyd, Atlanta, Ga., assignor at Atlanta Harness and Reed Manufacturing Company, Atlanta, Ga., a corporation of Georgia.

For association with a cotton harness making machine, the inventor provides a mail eye clinching device including a slotted needle on which the eyes are adapted to be stacked, an anvil, a clinching lever which cooperates with the anvil for clinching the eyes and a holder aligned with the needle and adapted to guide the eyes over the clinching lever and support them.

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No. 2,031,014, MACHINE FOR MAKING ELECTRICAL CABLES, Patented February 18, 1936 by Horace A. Stamples, Plainfield, N. J., assignor to Habirshaw Cable and Wire Corporation, New York, N. Y., a corporation of New York.

More specifically, the machine is adapted for providing a metal sheathing or cable, the invention lying in the provision of a chamber for receiving heated metal and from which the sheath is adapted to be extruded by a ram which exerts pressure on the metal therein. The construction is such that air is excluded from the chamber during the extruding operation.

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No. 2,031,167, WIRE SPLICER, Patented February 18, 1936 by Laudie E. Krosman, Scio, Oregon.

A block is provided for holding the wire end in abutment and a thin closure plate mounted on the block and swinging so as to hold the wire end in place.

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No. 2,031,889, COUPLING LINK, Patented February 25, 1936 by Earl W. Himberger, Seattle, Wash., assignor to Pacific Marine Supply Company, Seattle, Wash., a corporation of Wash.

An integral connecting link is provided comprising straight portions forming a shortlapped side bar with a longer straight tension bar terminating in inturned, curved bearing-bends, having a comparatively short radius, and a pair of deflector bars disposed at opposite inclined acute angles to the tension bar and located between the bearing-bends and the short side bar.

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No. 2,031,894, APPARATUS FOR TYING COIL SPRINGS TOGETHER, Patented February 25, 1936 by Samuel Krakauer and Samuel S. Marcus, New York, N. Y.

The inventors provide a number of rollers having grooves arranged to receive the spirally formed wire and as the rollers rotate they move the wire toward the springs to be tied thereby while simultaneously rotating the spirally formed wire.

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No. 2,032,260, WIRE FEEDING APPARATUS, Patented February 25, 1936 by Verni J. Chapman, Schenectady, N. Y., assignor to General Electric Company, a corporation of N. Y.

The device is adapted for feeding wire so that the latter will be fed evenly and under a regular tension.

Make Your Plans Now To Attend

THE ANNUAL WIRE ASSOCIATION MEETING AND CONVENTION

To Be Held In Association With The

NATIONAL METAL CONGRESS

At CLEVELAND, O. OCTOBER 19th to 23rd, 1936

'Round the World With the Wire Industry

Increased Receipts of Straps And Hoops Into Argentina

ARGENTINE imports of "straps and hoops" during the first nine months of 1935 (14,283 metric tons) increased some 35 percent when compared with those received during the same period of 1934. This increase reflected renewed activity in certain manufacturing branches (particularly steel shutters). Larger quantities are also being consumed in the production of wine and spirit barrels. The strengthening trend in the local wool market coupled with the increased demand in foreign markets, has also played a part in these increased imports.

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Growing Demand For Tacks In Mexico

THERE is a fairly large and growing demand for tacks in **Mexico.** The chief consumers are understood to be manufacturers of furniture, trunks and bags, and boots and shoes. Tacks, nails, brads, etc., are manufactured locally on a rather large scale, the bulk of the requirements being supplied from that source. Imports of tacks from the United States (the chief source of imports) have declined steadily during recent years, and in 1933—the latest year for which statistics are available—amounted to 22,349 pounds valued at $2,107 as compared with 62,694 pounds valued at $9,369 in 1930. The local industry is protected by a fairly high import tariff and has made considerable progress in recent years.

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Czechoslovak Wire Imports Gain In First Ten Months of 1935—Exports Drop

IRON and steel wire imports into **Czechoslovakia** during the first ten months of 1935 (1,459 metric tons valued at 6,270,000 crowns) increased 11.4 percent in quantity and 8.4 percent in value when compared with receipts during the corresponding period of 1934. (One crown equivalent to $0.0415 U. S. currency). Exports (20,620 tons valued at 18,311,000 crowns) recorded a decrease of 10.9 percent and 8.3 percent, respectively, when compared with the previous year.

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DOMESTIC production of iron and steel wire (excepting wire strands used in wire rope manufacture, and certain types of thin wire) is more than sufficient to cope with local demand, and a substantial exportable surplus is available. Imports consist primarily of wire strands and "thin black drawn wire" for the manufacture of needles, heddles, carding wire, etc., and for the most part are purchased from Germany. The principal items exported from the Czechoslovak production are "rolled wire and black wire of 1.5 millimeter in thickness".

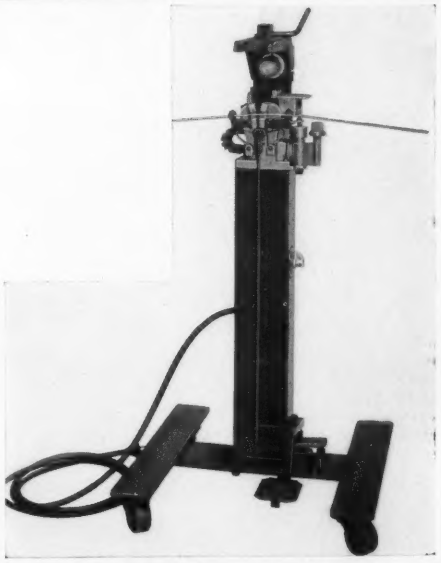
(*Please turn to page 192*)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

Micro-Weld Butt Welders

The increasing use of these efficient butt welders by leading wire manufacturing and fabricating plants throughout the world, is evidence of the superiority of MICRO-WELD design and construction.

Only MICRO-WELDERS are equipped with the patented MICRO-WELD adjustment dials for making precision welds faster.



MICRO PRODUCTS COMPANY

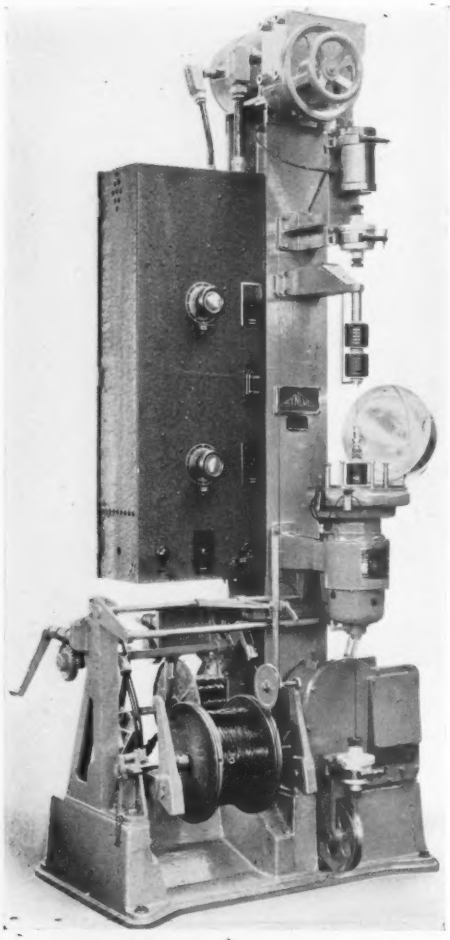
20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone State 7468 General Office and Factory, Peoria, Ills.

'Round the World With the Wire Industry

Temporary Extension of Czechoslovak Screw Cartel

THE **Czechoslovak** Screw Cartel (established February 1, 1931 and scheduled to have expired December 31, 1935) was temporarily extended to January 30, 1936. It is proposed to extend the present cartel for five years (to December 31, 1940), and the temporary arrangement was made pending negotiations with those manufacturers which are not members. The present membership includes 9 cartel members and two "outsiders". The sales office of the organization is "Helika", Limited Liability Company, 53 Luetzowava, Prague II. The annual turnover ranges between 25-30 million crowns.



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High speed Insulating Machines efficiently serve fibrous and web insulations on solid and stranded wires and cords.

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Production of Specific Steel From Iron Sand

EXTENSIVE deposits of iron sand exist in **Japan**, and repeated attempts to utilize them commercially have been made without success. Recently, however, the Japan Iron Sand Industrial Company, Ltd., has succeeded in producing "specific steel" directly from iron sand by a patented process. A plant to produce on a commercial basis has been practically completed by this company (organized in 1934), and operations are expected to commence early in the current year.

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The Algoma Steel Corporation, Sault Sainte Marie, Canada

THE producing plant of the above-mentioned **Canadian** concern consists of four blast furnaces (one in operation at present); eight open-hearth furnaces of 60,000 tons capacity (five in operation); and four open-hearth furnaces of 80,000-ton capacity. The mechanical plant includes a 12-inch bar mill; an 18-inch bar mill; a 30-inch rail mill; a 32-inch billet mill; and a 35-inch bloom mill. The 30-inch mill (built in 1930) rolls rails up to 160 pounds per yard, and it is in this mill that the larger structural sections, sheet piling, zee bars, etc. are rolled.

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FINISHED steel products to the extent of some 135,000 tons were produced during 1935, of which about one-half was for railway use and the remainder for commercial and other purposes. An average of 2,000 men were employed during the year.

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German Wire Rope Syndicate Extended

EXTENSION of the Association of **German** Wire Rope Manufacturers is reported to have been made until December 31, 1936. Domestic business in wire rope is reported satisfactory, but export markets are faced with determined competition. German exports during the first 11 months of 1935 (11,855 metric tons) increased 33

'Round the World With the Wire Industry

percent over those made in the comparable period of 1934.

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THE German Steel Wire Association reports that domestic business did not show any improvement during December, but that a slight gain was registered in the export trade. Negotiations are pending in connection with the extension of this Association, and the belief exists that a one-year extension will result.

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THE British wire netting manufacturers' association has recently advanced quotations 2½ to 5%, and the continental industry has advanced prices for export to South Africa by 5%, and to all other markets 3 to 6%. The demand for wire netting continues to be satisfactory. The demand for heavy netting of large sizes is better than that for small sizes. Export movement of square wire netting is also satisfactory. Prices for square wire netting have been advanced by £ 1.0 per ton for nearly all sizes. Steel prices have also increased 7 to 15 shillings per ton for almost all markets.

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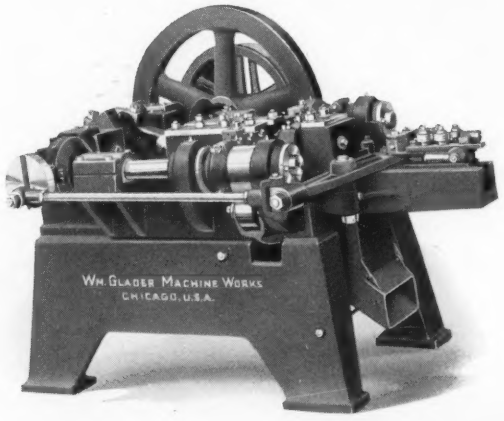
THE German wire industry has received an order from the Chinese Post Office for 200 tons of galvanized wire, an order for 90 tons of the same wire from South Africa, and an order for 120 tons from a Latin America Government. The general trend of export trade is quieter than last month, but as a whole remains satisfactory. The outlook for the continuation of the continental wire rod cartel is satisfactory even though the recent meeting of the continental wire rod manufacturers had been broken up and postponed. No price cutting is noticeable. The Japanese wire industry competition is more active in galvanized wire and barbed wire than in other wire products.

THE demand for wire making machinery from domestic sources continues satisfactory, particularly as the Government has extended the draft bill, by which new machinery purchases can be deducted 100% from income taxes. Therefore, many manufacturers are replacing obsolete machinery with new models. The export demand is also satisfactory; orders from Italy, Great Britain, Japan, etc. are continuing to pour in. Prices for machinery are steady. The German industry will also receive a number of important export orders for wire machinery from Russia. The compensation agree-

(*Please turn to page 195*)

GLADER

HIGH SPEED WIRE NAIL MACHINE



Machines are built in nine sizes to cover a range of nails from 15 gauge 1/4" long to 3/8" diameter 12" long, including large head roofing nails.

A month's operation of one of our latest type machines will produce an average of more than 200 pounds of 8d common nails per hour.

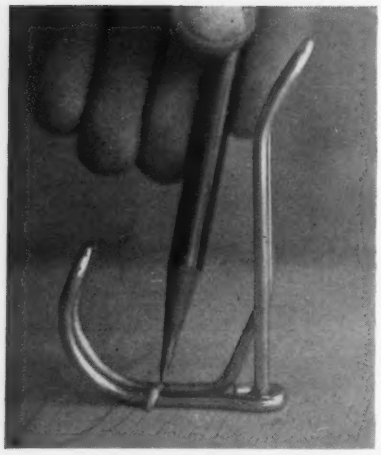
These machines are well liked by operators, due to the fact that adjustments are easily made and can, in most instances, be made while the machine is in operation.

The performance of these machines, both as to production and low maintenance cost has led to their exclusive selection in all of the recent major nail making machine installations.

WM. GLADER MACHINE WORKS

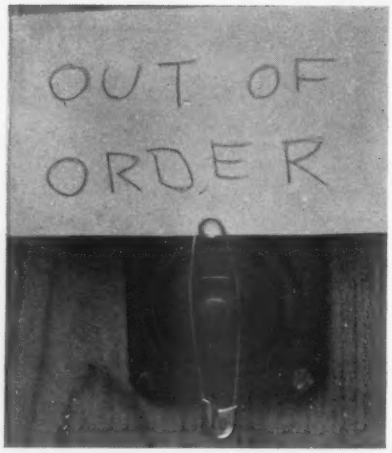
210 N. RACINE AVE. CHICAGO, ILL.

Odd Uses For Discarded Wire



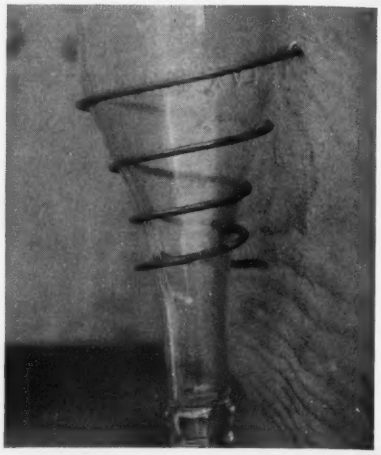
Easily Makes Common Wire Wardrobe Hook a More Firm and Secure a Device

THE ordinary wire wardrobe hook as far as its shape is concerned cannot be excelled for the purpose of holding garments. However no matter into how hard a wood the screw is turned, it often quickly loosens due to the continual application and removal of garments from the hooks. With a file, make a small nick in one of the two lower wires and drive a small staple in over it as shown. This firmly keeps it from turning and is not in the way in the least. A set of hooks put up and fixed in this manner will stay tight and firmly in place for years.



To Easily and Quickly Attach Card To Call or Signal Bell Button

'OUT OF ORDER' signs and cards very often in an emergency due to defectiveness must be hurriedly attached to signal and call bell buttons such are frequently located against finished wood or metal where a card cannot be conveniently affixed. Slip the card in between the two loops or coils on the end of a common safety pin. Close and hook the pin and spring the body of it over the end of the button as shown. It will stay there snugly and firmly in place. Not a thing to make but the small card. A handy one to remember.



The Old Wire Auto Seat Spring Has a Handy and Practical Application

THE pint or quart long neck bottle is commonly used by the painter, mechanic, and other craftsmen to contain many fluids used in their work. Such bottles are of course often cleaned and washed out to be filled with other fluids. They must of course be thoroughly drained. To safely and handily hold them, an old wire seat spring can be made use of as shown. One of the larger ends is cut off, a portion of the wire bent so it will firmly stick into the wall. The larger or top portion is fastened with a small, strong staple. This easily and quickly makes a perfect holder for the bottle, into which it can be placed in an inverted position, and left to drain and dry.

ACE MR-10 RUBBER LINED
WIRE PICKLING TANK WITH STONE FACING

AMERICAN HARD RUBBER COMPANY
Information and Catalogue on Request
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'Round the World With the Wire Industry

(*Continued from page 193*)

ment with the Russian industry is to be extended for another nine months. The German industry participated with 1.7 Million Marks worth of wire manufacturing machinery in the 200 Million Mark compensation agreement, which expires at the end of this March. In the new agreement under negotiation, the figure is to be trebled. An Irish factory has placed an order for the equipment of a whole new factory.

✦ ✦ ✦

THE export trade in wire nails to the United States continues in heavy quantities, but orders for barbed wire and other wire are declining; this is also true of wire netting orders. Rumors that the American wire industry has come to an agreement with the continental wire industry concerning trade with Latin America are again heard, and it is not denied that such negotiations will be continued.

✦ ✦ ✦

IT is interesting to note that although the export value of stainless steel wire amounted to only $19,000 in 1931 and to only $228,000 in 1933, it increased to $405,000 last year. Nearly all countries are buyers, particularly the European markets.

✦ ✦ ✦

Upward Trend Observed in Scottish Iron and Steel Activity

WORK in the Glasgow, **Scotland,** district's iron and steel mills was resumed following the holidays after a shorter stoppage than usual (a fact worthy of note in consideration of the very heavy demands on machinery during the latter half of 1935 and the consequent urgent necessity for repairs). Orders on hand alone are sufficient to insure full-time working conditions for at least the first half of the current year, it is stated, while forward business is expected to develop in "due course."

(*Please turn to page 196*)

wire styled for your needs

Years of experience with wire users place KEYSTONE in a position to work intelligently with you. New designs, new problems are creating new needs for wire—and—this organization has *the will* and facilities to produce the type of wire that will help to lick your problems, lower your costs.

HIGH CARBON OR LOW CARBON:
Bright
Tinned
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Quick-service is another thing that interests you. KEYSTONE will come through on time.

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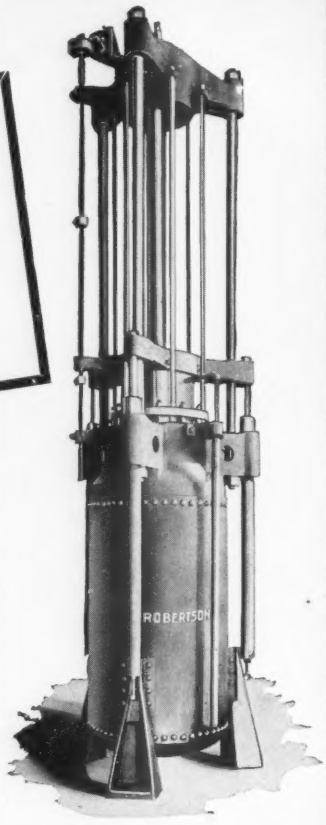
The ROBERTSON HYDRO-PNEUMATIC ACCUMULATOR



The most Compact unit made . . . . . it utilizes its Air Tank as a Base . . . . . .

The minimum of floor space is required, and an ordinary factory floor is sufficiently strong to support this equipment.

Hydro-pneumatic Accumulators are built by us for pressures from 1500 lbs. to 6000 lbs. per sq. in. and in any capacity from 2½ gals. to 96 gals. Air pressure at 175 pounds per square inch is supplied from a small auxiliary air compressor for maintaining pressure in the air storage tank. The hydraulic cylinder is bronze bushed and the moving platen is fully guided to the three tie-rods. Limit switch and tell-tale rod provide for automatic pump control.

Write today for complete information concerning this modern unit. No obligation.

Robertson makes all types of lead-encasing machinery required by rubber hose and electrical cable makers including Lead Encasing Presses; Extrusion Presses; Hydraulic Pumps; Melting Furnaces and Pots, Dies and Cores; and Lead Sheath Stripping Machines.

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Pioneers~Since 1858
125-37 Water Street Brooklyn, N. Y.

'Round the World With the Wire Industry

(*Continued from page 195*)

The outlook for the industry at present is said to be better than it has been for the past decade. Diminished stocks of pig iron within the country (coupled with the strong and continued demand) has caused serious consideration to be given to increased supply. Twelve furnaces are now in blast and present scarcity of fuel for operation is the chief barrier to an increase in this number. Interest in this connection is centered around the new coke oven plant which is in process of erection in Glasgow, and which is expected to have an annual output of 180,000 tons of "metallurgical coke" as well as other qualities suited to domestic and industrial use.

✦ ✦ ✦

Japanese Nails Enter Palestinian Market

"NAILS manufactured in Japan have recently entered the **Palestinian** market," it is stated in the "Palnews," issue of December 10, 1935. "While it is true that the Japanese nails are of inferior quality, their price is even lower than the European dumping prices. Together with customs duty and other expense, the Japanese nails cost tp. 14.600 (Palestine pounds) per ton, whereas until recently the dumping price of European nails was £P. - 16.500 per ton. As a result of the Japanese competition, the price of the European product has also been reduced to £P. 14.600 per ton. The normal European price is £P. 23 a ton. Under such conditions, the Palestinian industry has no hope of facing the competition."

PROCEEDINGS AND DISCUSSIONS of the 1935 WIRE ASSOCIATION MEETINGS

Price $5.00 Per Copy

Report on the Diamond Market During 1935

IN the yearly report on the diamond market issued by J. K. Smit & Zonen, of Amsterdam, Holland, in connection with industrial diamonds they bring out the following interesting points.

✦ ✦ ✦

"INDUSTRIAL diamonds" have, during the year under survey, found a more favorable market. This was prominently the case in the United States where the automobile industry worked to almost full capacity, and in Great Britain where the industrial position was showing a marked improvement.

✦ ✦ ✦

AMONG the factors contributed towards the improvement in this market, first place must undoubtedly be given to the general revival to quite a considerable number of industries. In Europe the increased demands for armaments, especially during the latter half of the year, was considerably affected, and last but not least the general desire to restore diminished stocks, owing to the tendency to hold goods rather than cash.

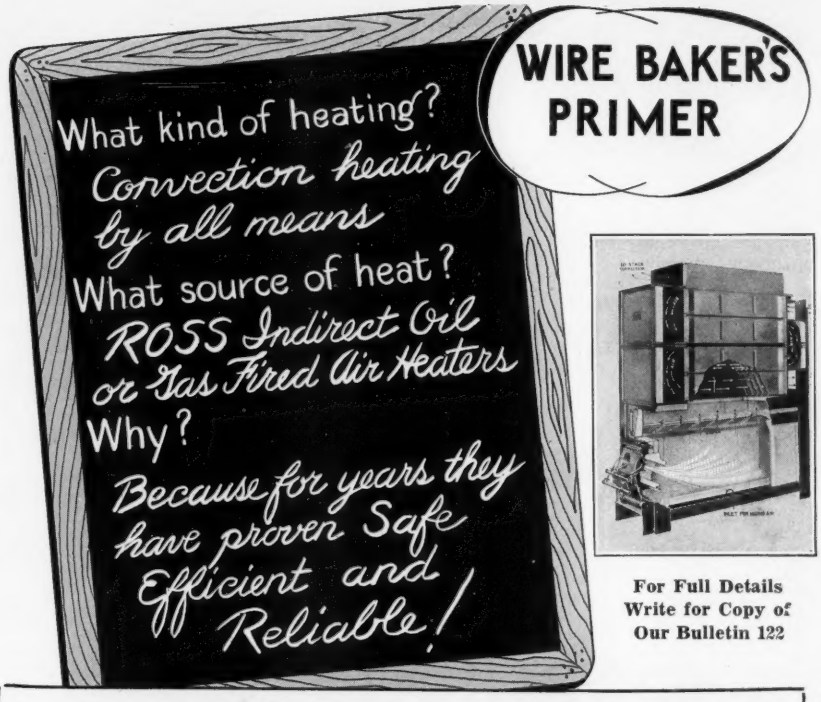
✦ ✦ ✦

A CERTAIN scarcity of this article made itself felt, especially in the more popular sizes from 1 to 1½ carat. The prices of these goods are now even higher than they were during the period of highest quotations before the war. Likewise "Finehards" in sizes of from 3 to 12 per carat were in great demand, so that they were becoming scarcer all the time.

✦ ✦ ✦

THIS scarcity created a demand for the cheaper kinds of diamond, such as the West African. This kind of diamond, however, is very brittle and of poor shape. Brazilian diamonds are eminently suitable, but their production remains on the same low level. Of this article it has always been our aim to purchase as much as we could possible obtain. There has been a steady increase in core drilling all over the world which can to a large extent be explained by the demand for gold, but we have no doubt that a demand for other minerals also will presently arise, so

(*Please turn to page 199*)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Convection heating by all means
What source of heat?
ROSS Indirect Oil or Gas Fired Air Heaters
Why?
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Report on the Diamond Market During 1935

(*Continued from page 197*)

that a further increase in core drilling may be looked for.

✦ ✦ ✦

THE demand for dressing diamonds grew considerably in 1935 and increased by at least 90%. There was also an improvement in the wire drawing industry.

✦ ✦ ✦

Better Packages for Shipping Power Cable

THE question of a better package for the shipping of electric power cable and other similar products has been under consideration. Considerable progress has been made in the way of design for steel reels with an acceptable form of lagging. There are many factors involved, such as structural design for the various loads, weight and general usability.

✦ ✦ ✦

OBVIOUSLY, the first cost of such a package is greater than present reels, and this has had the effect of retarding the adoption of a reel that will meet the demands for better and safer handling of this high priced product.

✦ ✦ ✦

IT has been suggested from time to time that there should be formed a holding company to own and lease steel reels for the industry, holding inventory at all times that would meet requirements. The objective of such a move would be to decrease the original capital investment necessitated by each manufacturer holding a sufficient supply of reels.

✦ ✦ ✦

IT would be interesting to get the reactions of those interested and affected by such a movement.

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS
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Have you received the data on this NEW Oakite coating material?

A NEW and better coating material is now available that will be of real interest to wire mill superintendents everywhere. One of its several advantages when used on low carbon wire is that it dries in a few minutes so that a baking operation is unnecessary. Saves time in handling . . . helps speed production. This new development in a coating material . . . Oakite Composition No. 42B . . . is already in successful use. It is a result of our many years' experience in wire mills. Let us send you further information. No obligation.

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We Have Just Developed an
Automatic Sparker with
Various Steps of Voltage up to

50,000 VOLTS

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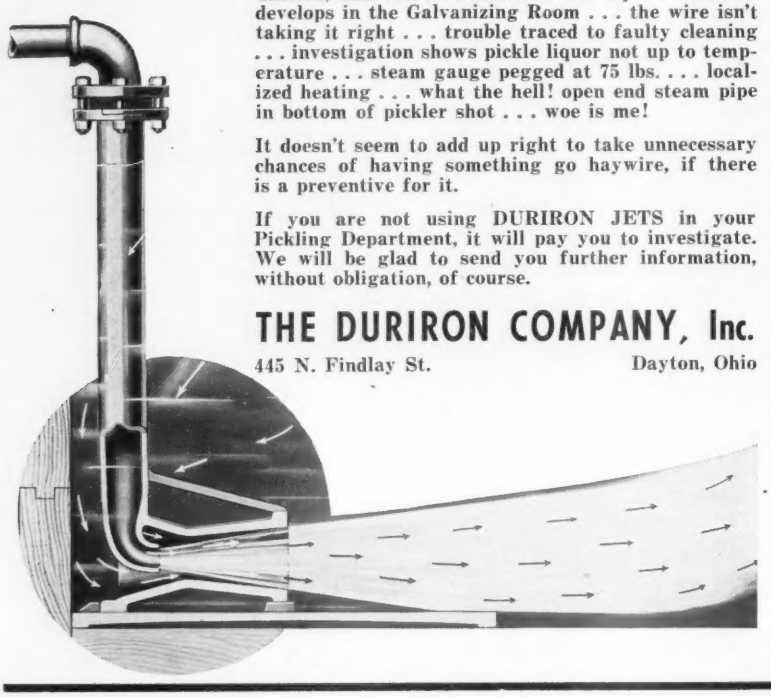
Pity the poor Maintenance Man:



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It doesn't seem to add up right to take unnecessary chances of having something go haywire, if there is a preventive for it.

If you are not using DURIRON JETS in your Pickling Department, it will pay you to investigate. We will be glad to send you further information, without obligation, of course.

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The strong passivating effect of this excellent inhibitor insures a bright finish and forms a sound basis for a bright drawing technique—

▲ ▲ ▲

DELANY CHEMICAL CO.

COTTMAN AND MILNOR STS.,
PHILADELPHIA, PA.

Outstanding Personalities of the Wire Industry

(*Continued from page 187*)

cupied a similar position at the Lowellville works of the Sharon Steel Hoop Company.

✦ ✦ ✦

Francis Hodgkinson

THE retirement of **Francis Hodgkinson,** one of the outstanding figures of the engineering profession, from the employ of the Westinghouse Electric and Manufacturing Company was marked recently with a dinner given in his honor by the employees of the Company's South Philadelphia Works, at the Racquet Club in Philadelphia.

✦ ✦ ✦

CO-WORKER with Sir Charles Parsons and later right hand man of George Westinghouse in the development of the steam turbine in the United States, Mr. Hodgkinson leaves Westinghouse Company after 42 years of outstanding service to that company and to the Engineering profession.

✦ ✦ ✦

MR. HODGKINSON was born in London, England, and educated in the Royal Naval School, New Cross, England, and came to Westinghouse in 1896. He was responsible for steam turbine construction until 1916 when he was made Chief Engineer for all steam power apparatus. In 1926 he was made Consulting Mechanical Engineer which position he has held until the time of his retirement.

✦ ✦ ✦

HE was awarded the Silver Medal of the Louisiana Purchase Exposition, St. Louis, in 1904; the Elliott Cresson Gold Medal from the Franklin Institute of Philadelphia in 1925; the Willans Gold Medal from the Institution of Mechanical Engineers and the Institution of Electrical Engineers of Great Britain in 1931, and in 1935 he received the Honorary Degree of Mechanical Engineer from the Stevens Institute of Technology.

✦ ✦ ✦

HE was a member of the following associations: Engineers' Society of Western Pennsylvania, American Society of Mechanical Engineers, American Institute of

Electrical Engineers, and Institute of Mechanical Engineers of Great Britain.

✦ ✦ ✦

Two New Managers of Sales for Sections of G-E Industrial Department

THE appointment of Harry A. Winne and John C. Miller as managers of sales for two sections of General Electric's industrial department has been announced by J. E. N. Hume, manager of the department. Mr. Winne, formerly in charge of the steel mill section of the industrial engineering department, has been made manager of the mining and steel mill section, succeeding K. H. Runkle who was recently made an assistant manager of the industrial department. Mr. Miller, who has been in charge of the department's aeronautical section for some time, has been appointed manager of sales for that section. Both appointments became effective Feb. 6.

✦ ✦ ✦

Controlled Atmosphere Applications to Heating of Ferrous and Non-Ferrous Metals

(*Continued from page 186*)

IN batch furnace applications, the requirements of the operation are such as to necessitate the separation of furnace from charge at some point in the cycle, and removing the charge from the protection of the furnace. In such applications, the use of a retort offers a convenient and perhaps the most reasonable solution. The major problem then becomes the matter of gas tightness in the retort proper.

✦ ✦ ✦

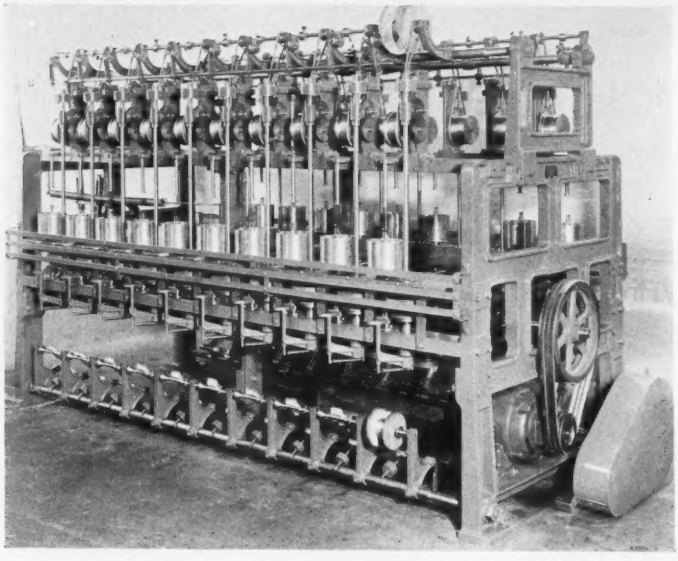
IN continuous furnaces, except in smaller sized units, retort design and maintenance present serious problems. Combustion tubes in such applications are comparatively new and possible problems that may develop if their use is continued concern temperature distribution, disposal of products of combustion, maintenance cost, except in low temperature operation; the matter of furnace tightness about the multiplicity of expanding and contracting openings into the furnace structure, and possible disturbance of furnace atmosphere in the event of tube failure. It would appear that for continuous furnaces applications necessitating controlled atmosphere, and where economic conditions are not too favorable, the electric furnace offers less compromise than any other.

✦ ✦ ✦

OTHER than as noted above, the furnace requirements for controlled atmosphere applications are quite conventional, with perhaps the single exception of furnace lining. Conventional types of conveying mechanisms are employed, the greatest change from ordinary design and appearance being evidenced in the necessary means to insure gas tightness.

THE foregoing article deals almost exclusively with the application of controlled atmosphere to the heating of ferrous products.

THE second installment of this article dealing with non-ferrous products will appear in an early issue of Wire & Wire Products.



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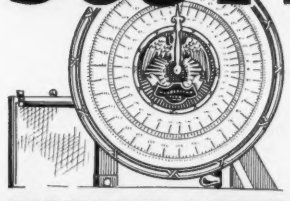

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A COMPREHENSIVE bulletin covers all phases of this most modern process for rust-proofing steel products. Many excellent color illustrations are shown of the results of both accelerated and actual service tests proving the value of Cromodizing as compared with other commercial treatments. Particularly explained is the case with which Cromodizing can be adapted to protecting a wide field of steel, cast iron, malleable iron, and forged steel products.

Issued by the American Chemical Paint Company, Ambler, Pa. Copies on request.

American Society for Metals, Chicago Chapter

MR. Francis B. Foley, Superintendent of Research at the Midvale Steel Company, was the guest speaker at the monthly meeting of the Chicago Chapter of the American Society for Metals held February 13. Mr. Foley has been a member of the Society for the past sixteen years and is past chairman of the Philadelphia Chapter. He is affiliated with the American Chemical Society, British Iron and Steel Institute, American Institute of Mining and Metallurgical Engineers and the American Society for Testing Materials.

✦ ✦ ✦

A VERY interesting talk was given on the subject "Steel Alloys for High Temperature Service". The construction of equipment for measuring elongation of alloy specimens at elevated temperatures were shown by means of slides for study. On the basis of graphical representation of the measurements of creep over a period of several years, Mr. Foley questioned the authenticity of European charts for shorter periods of time. The actual curves for creep of alloys at high temperatures exemplify the statement that there is an annealing effect counteracting cold working caused by load on the specimen. The effect of adding manganese, molybdenum and chromium to carbon steel were shown, although the data was not complete. Various chromium-nickel steels were listed showing comparative tensile strengths at temperatures to 2000 degrees F. During the discussion it was learned that the addition of stellite and molybdenum prevented the seizure of bolts and nuts in tests made at high temperatures.

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Remote Valve Control

TO supplement automatic control systems, The Foxboro Company, Foxboro, Mass., developed recently the new Remote Hand Control. In many processes, Automatic Controllers stabilize the operation to such an extent that many non-critical flows may be governed by hand valves, which need be readjusted very infrequently. However, if these hand valves are not easily accessible, it is only natural that even the few necessary adjustments will be neglected. Where these conditions exist, a Foxboro Remote Hand Control mounted on a centrally-located panel enables the operator to adjust manually the degree of opening of an out-of-the-way, inaccessible valve without moving from his station. With it, he can reset a valve several hundred feet away to control temperature, pressure, flow or liquid level using readings from his recording instruments to guide him in making the correct adjustments.

✦ ✦ ✦

A FEATURE of this Remote Hand Control is the extreme precision of valve setting. It is easy to make a change in pressure on the diaphragm motor of the controlled valve as small as ¼" of water or less. This means that the valve opening can be altered by as little as a few thousandths of an inch to produce the exact desired flow of controlled medium. Used in conjunction with a Stabilflo valve, the controlled flow can be changed by less than 1%. Due to its original unique design, there is no pumping or vibrating; air pressure on the diaphragm is held exactly at the desired setting.

✦ ✦ ✦

SIMPLICITY and ruggedness mark both the design and construction of the Foxboro Remote Valve Control. Finished in lacquered cast bronze trimmed with buff nickel, it is a fitting addition to any instrument panel.

✦ ✦ ✦

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Wire mills that have equipped their braiding machines with *Productimeters* find that machine efficiency goes up, cost of braiding goes down, and operators make better wages. Installation costs have been paid off in from 6 to 12 months.

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Write for further information. We may be able to solve your difficulties.

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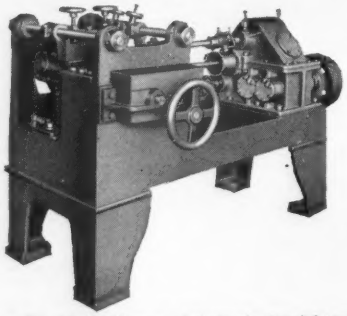
New Continuous Automatic Wire And Bar Straightening and Polishing Machine

A New Continuous Automatic Straightening and Polishing Machine for Wire, Bars and Tubular Products, from 1/8" to 3/4" diameter has just been put on the market.

✦ ✦ ✦



New No. 00 Continuous Automatic Straightening and Polishing Machine. ✦ ✦ ✦

THIS machine is of the two-roll type—namely one concave and one straight-face roll. The wire (or bars) is rotated as it advances between these two revolving rolls. Straightening is accomplished by the roll pressure which causes a flexing of the wire as it passes between the rolls. The action of the concave roll polishes the wire as it passes through the machine.

✦ ✦ ✦

OUT-OF-ROUNDNESS of the wire, due to wear of the drawing die, is corrected by the roll pressure, plus the action of the revolving of the roll. The higher the roll pressure, the more pronounced is the correcting action.

✦ ✦ ✦

THE gearing in the New No. 00 machine is entirely enclosed—and so arranged that it constantly runs in oil . . . The high-speed shaft on which the multiple V-groove sheave is attached is Timken-bearing equipped. The bearings on the roll yoke are likewise Timken equipped—so that the high speed, high pressure parts all have anti-friction bearings. The slower speed bearings are made from the best heavy-duty Marine bronze.

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✦ ✦ ✦

Convected Air Furnace Bulletin

A VERY interesting bulletin describing Convected Air furnaces has just been issued by the Despatch Oven Company of Minneapolis, Minnesota. This bulletin, which is just off the press, contains valuable information for users of heat treating ovens.

✦ ✦ ✦

COPIES of the bulletin will be mailed upon request to the Editor of "Wire and Wire Products".

✦ ✦ ✦

THE **Brunton Works,** Musselburgh, Scotland, builders of the Haigh-Robertson Fatigue Testing Machine for Wire and Rods, which was reviewed in the July issue of this periodical, announce the appointment of **C. W. Oliver,** 2783 Broadway, New York City, as sole U. S. selling agent for this improved wire testing machine, in place of the former firm of of During & Oliver now dissolved.

PAPER CABLE FILLER
FOLDED PAPER FLATS
PAPER INSULATION YARNS
E. W. TWITCHELL, INC.
Formerly National Patent Reed Co.
3rd & Somerset Sts. Phila., Pa.

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ZINC STRIP
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TRENTON, N. J.

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ROD MAKING
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W. A. SCHUYLER
FISK BLDG. NEW YORK

Wire Drawing Diamond Dies
COCHAUD
WIRE DIE CORPORATION
300 W. 56th ST., NEW YORK
Tel. Col. 5-1340

Machine For Testing Fine Wire

INVENTION of a machine that will test wire as thin as the filament in electric light bulbs has been announced at Columbia University. It was developed by John N. Kenyon, testing engineer in the School of Engineering laboratories.

✦ ✦ ✦

THE new device is expected to help lessen the number of cable rope failures in elevators and other hoisting apparatus. Previously the effect of stress and strain upon wire having a diameter of .08 inches or less was unknown, it was pointed out, constituting a threat to public safety since some elevator cables have metal strands with a diameter of .024 to .05 inches.

✦ ✦ ✦

IN the new machine the wire is suspended in the shape of an arc in a pan of oil and is revolved at the rate of 5,000 to 10,000 revolutions a minute by a small electric motor. The strain soon begins to tell upon surface scratches or imperfections.

✦ ✦ ✦

New Indicator Catalog

A NEW indicator catalog has been issued by the Federal Products Corporation, Providence, R. I.

✦ ✦ ✦

IT includes such new instruments as they have recently brought out and also includes line diagrams for the convenience of users of indicators, together with special matter devoted to practical applications of dial indicators. Included is data relating to a stress gauge for determining the compressibility of semi-hard materials, a gauge for checking spools for thread manufacturers, another for checking the serrations of thread dies, etc.

✦ ✦ ✦

COPIES of the catalog may be obtained by addressing the Editor of "Wire and Wire Products".

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1936 Buyers Guide & Yearbook
Of the Wire Association
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Lynn, Massachusetts.

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DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

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ABRASIVES—
Norton Co., Worcester, Mass.

ANNEALING POTS AND BOXES
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANODES—Nickel
Seymour Mfg. Co., Seymour, Conn.

ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Seymour Mfg. Co., Seymour, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS—Rod and Wire
Lindberg Engineering Co., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Morrison Engineering Co., Cleveland, O.
Ross Engineering Corp., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin Co., The Wm., Pittsburg, Pa.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Duriron Co., The, Dayton, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.
Houghton & Co., E. F., Philadelphia, Pa.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.

COMPOUNDS—Cleaning
Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.

CONDUITS—Iron and Steel
Youngstown Sheet & Tube Co., Youngstown, Ohio.

CRANES—Wire Mill
Cleveland Electric Tramrail Div., of Cleveland Crane & Eng. Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver Harris Co., Harrison, N. J.
Kelly Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Cochaud Wire Die Corp., New York.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Vianney Wire Die Wks., N. Y.

DIES—Rod and Tube Drawing
Bissett Steel Co., Div. of Tungsten Electric Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Co., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Bissett Steel Co., Div. of Tungsten Electric Co., Cleveland, O.
Kelly Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Bissett Steel Co., Div. of Tungsten Electric Corp., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Co., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEERS—Consulting Galvanizing
W. H. Spowers, Jr., New York, N. Y.

ENGINEER—Consulting Wire Mill
Lewis, Kenneth B., New York, N. Y.

BUYERS' GUIDE, Continued

ENGINEERS—CONSULTING—Non-ferrous Wire Mill
New Products Development Corp., Yonkers, N. Y.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACES—Annealing
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Ross Engineering Corp., New York, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Automatic
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Ross Engineering Corp., New York, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.

FURNACES—Hardening and Tempering
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
John Robertson Co., Brooklyn, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Non-Oxidizing
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Wire, Strip and Sheet
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Ross Engineering Corp., New York, N. Y.
Surface Combustion Co., Toledo, O.

GEARS—Wire Mill
Farrel-Birmingham Co., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Ansonia, Conn.
Norton Co., Worcester, Mass.

HANDLING EQUIPMENT—Material
Cleveland Electric Tramrail, Div. of Cleveland Crane & Eng. Co., Wickliffe, O.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Parkin Co., The Wm., Pittsburgh, Pa.

INSULATION—Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

LININGS—For Acid Tanks
American Hard Rubber Co., New York, N. Y.

LUBRICANTS—Wire Drawing
Gore, T., Brooklyn, N. Y.
Houghton & Co., E. F., Philadelphia, Pa.
R. H. Miller Co., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Saylor, F. D. & Son, Detroit, Mich.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Saylor, F. D. & Son, Detroit, Mich.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Covering Wire—
Saylor, F. D. & Son, Detroit, Mich.
Syncro Machine Co., Newark, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
Saylor, F. D. & Son, Detroit, Mich.
Syncro Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Material Handling
Cleveland Electric Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY—Measuring Wire & Cable
Davis Electric Corp., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis., and Providence, R. I.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader Mfg. Co., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Special—Combination Machine for Drawing, Cutting-to-length, Straightening and Reeling Bars from Coil in One Operation (Shumag Type)—
W. A. Schuyler, New York, N. Y.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

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MACHINERY—Testing Size of Wire
R. L. Davis Elec. Co., Wallingford, Conn.

MACHINERY—Testing Wire
Henry L. Scott Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Turks Head, For Rolling Special Shaped Wire
Standard Machinery Co., Auburn, R. I.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Auburn, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Wrapping Wire
W. A. Schuyler, New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Electric Tramrail Div., of Cleveland Crane & Eng. Co., Cleveland, O.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Sevmour Mfg. Co., Seymour, Conn.

OVENS—Annealing or Drying
Lindberg Engineering Co., Chicago, Ill.
Ross Engineering Corp., New York, N. Y.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Parkin Co., The Wm., Pittsburgh, Pa.

PICKLING—Tank Linings
American Hard Rubber Co., New York, N. Y.

POTS—Annealing, Case Hardening and Tempering
Lindberg Engineering Co., Chicago, Ill.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.

REEL CRUTCHES
Watson Machine Co., Paterson, N. J.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Morrison Engineering Co., Cleveland, O.

RODS—Wire—Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLLS—
Farrel-Birmingham Co., Ansonia, Conn.

RUST PROOF COMPOUND
American Lanolin Co., Lawrence, Mass.
Houghton & Co., E. F., Philadelphia, Pa.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Republic Steel Co., Youngstown, O.
Superior Sheet Steel Co., Canton, O.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SOAPS—Wire Drawing
Gore, T., Brooklyn, N. Y.
Houghton & Co., E. F., Philadelphia, Pa.
R. H. Miller Co., Homer, N. Y.

STRIP—Brass, Zinc and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—Wire
Henry L. Scott Co., Providence, R. I.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

TURKS HEADS—
Standard Machinery Co., Auburn, R. I.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.

VULCANIZERS
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Co., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Company, Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel and Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Seymour Mfg. Co., Seymour, Conn.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Steel—Also Copered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Brass, Zinc
Platt Bros. & Co., The, Waterbury, Conn.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

Make Your Plans Now To Attend

THE ANNUAL WIRE ASSOCIATION MEETING AND CONVENTION

To Be Held In Association With The

NATIONAL METAL CONGRESS

At CLEVELAND, O. OCTOBER 19th to 23rd, 1936

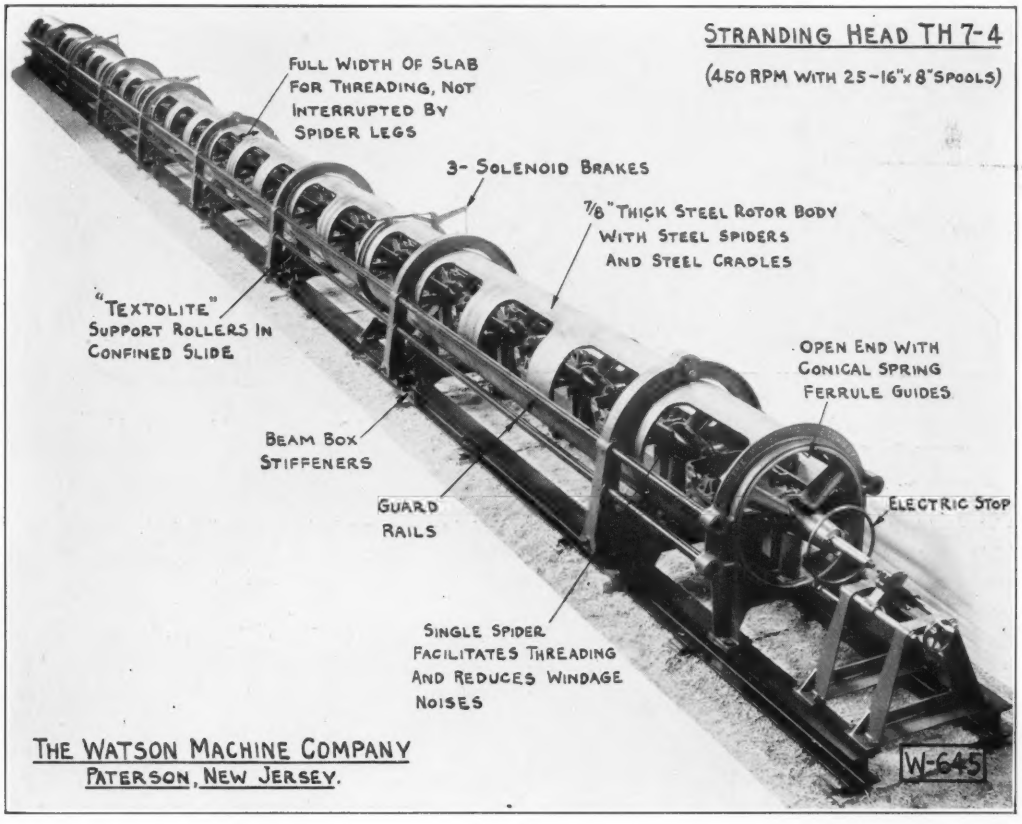
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ENGINEERS - FOUNDERS - MACHINISTS

Tubular High Speed (All Steel Rotor) Stranders

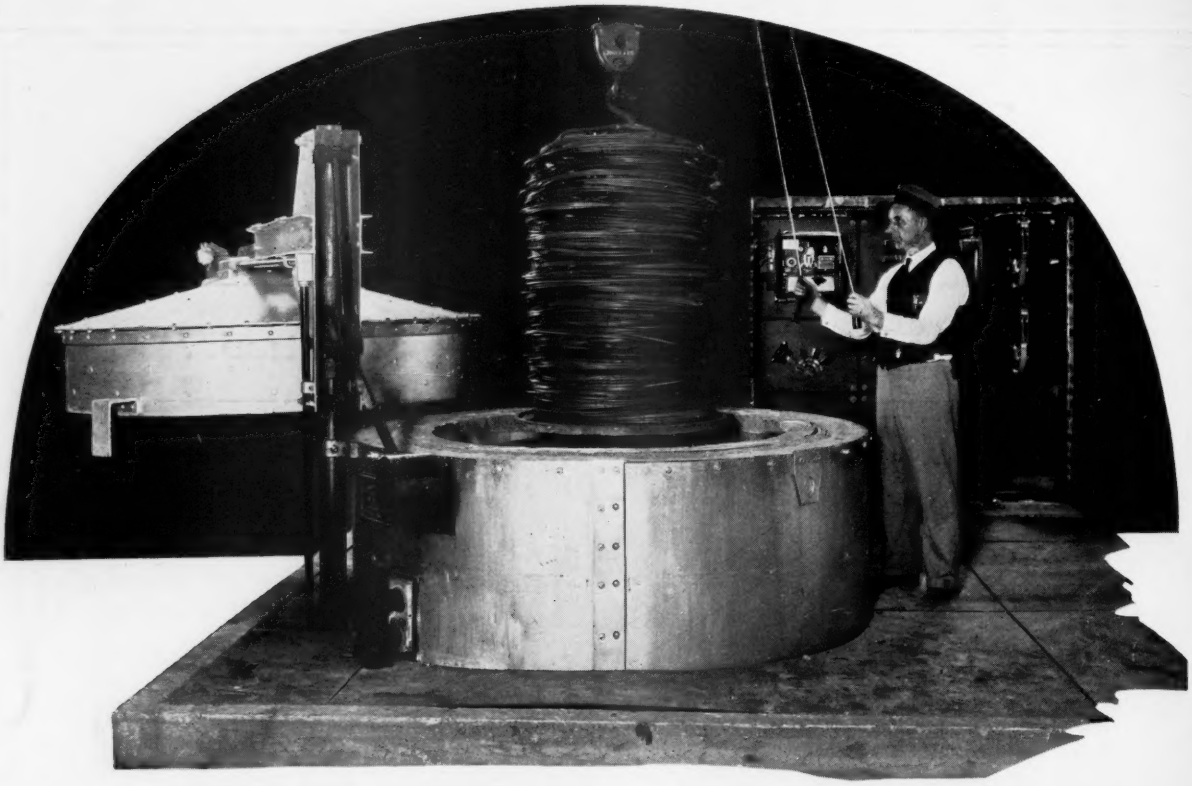

STRANDING HEAD TH 7-4
(450 RPM WITH 25-16"x 8"SPOOLS)
FULL WIDTH OF SLAB FOR THREADING, NOT INTERRUPTED BY SPIDER LEGS
3- SOLENOID BRAKES
7/8" THICK STEEL ROTOR BODY WITH STEEL SPIDERS AND STEEL CRADLES
"TEXTOLITE" SUPPORT ROLLERS IN CONFINED SLIDE
OPEN END WITH CONICAL SPRING FERRULE GUIDES
BEAM BOX STIFFENERS
GUARD RAILS
ELECTRIC STOP
SINGLE SPIDER FACILITATES THREADING AND REDUCES WINDAGE NOISES
THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY.
W-645

These machines are built standard by us in spool sizes of 25, 50, 100, 250 and 500 pounds; in 7, 12, 19 and 25-spool rotors.

Balanced Steel Rotor Body, with Steel Cradles and Spiders, Improved Threading and Guide Arrangements, with Textolite Support Rollers, are some of the main features.

We solicit your inquiries.

ELECTRICAL WIRE AND CABLE
WIRE ROPE and CORDAGE MACHINERY



Furnaces for the Wire Industry

The above illustration shows one unit of an installation of furnaces made in a prominent steel plant for annealing alloy wire rod in coils. Recent developments and installations in prominent wire plants include other interesting continuous and batch type furnaces for processes including the following:

Bright Annealing Steel Wire

New Pit-type furnaces equipped with Elfurno generator for control of surface condition on both wire and rod. Advantages include increased tonnage per pit, improved fuel economy, more uniformly annealed product, improved surface conditions, lower maintenance cost, decreased annealing time and labor requirements. Maximum flexibility—produce bright surface, semi-bright or otherwise as desired.

Clean Annealing Brass Wire

Several continuous, controlled atmosphere furnaces have also been built for clean annealing brass and bronze wire in coils. These furnaces handle both large and small coils and produce a uniform annealed product with excellent finish at low cost. Built in several sizes.

Bright Annealing Copper Wire

Continuous, controlled atmosphere furnaces with Elfurno generator for bright annealing fine copper wire on spools—no vapor or water seal of any kind are used in this equipment. The wire comes out uniformly annealed, bright and dry, ready for shipment or further processing. Can be built in sizes to suit any production.

Normalizing and Spheroidizing Rod

Several fuel-fired, pit type furnaces have also been installed for clean normalizing and spheroidizing rod and annealing low carbon steel wire in coils. Low operating and maintenance cost, greater uniformity and ease of handling are some of the advantages of these fuel-fired pits. They can be either gas or oil-fired and built in batteries or units to suit the production.

Other outstanding installations include continuous and batch type furnaces for billet heating; scale-free heat treating bolts and other products; for bright annealing tubing, stampings, etc., for copper brazing, carburizing and other heating and heat treating processes.

Put your annealing and heat treating problems up to our engineers—we'll build equipment to fit your specific requirements.

THE ELECTRIC FURNACE CO.

SALEM, OHIO.

Fuel Fired Furnaces

Electric Furnaces